Council has received requests for additional information from some community members.

This page provides clarification in relation to how options have been referenced in Council reports compared to the technical document.

Clarifications are as follows:

Safe Systems Analysis / Council Report - 18 October 2023

Extracts of the information provided within this Safe Systems Analysis (SSA) were included in the Council Project Report of 18 October 2023.

The report outlined four options for Councillor consideration, these were listed as Option 1, Option 2, Option 3, and Option 4.

The attached SSA document assesses 5x options and includes an 'Option 3A'.

Community Engagement Options

Community Engagement was undertaken on the following options contained within the Safe Systems Analysis:

- **Option 1:** Safety improvements including a kerbside protected bike lanes (Option A in the community engagement)
- **Option 3A:** Safety improvements including on-road buffered bike lanes (Option B in the community engagement, Option 3 in the 18.10.23 Council report)

Option 3 in Council Report

In the 18.10.23 Council report, <u>Option 3A (SSA) is referred to as Option 3</u>.

The change was for simplicity within the Council report.

The original design for Option 3 (within the SSA) was superseded by Option 3A.

The only difference between the options was the retention of existing parking offsets (and associated sightlines) in Option 3A which allowed additional parking to be retained.

SMEC INTERNAL REF. 30043159T

Safe System Assessment

Inkerman Street Safe Travel Corridor

Client Reference No. PO20013117
Prepared for: City of Port Phillip
11 August 2023

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Document Control

Document Type	Safe System Assessment
Project Title	Inkerman Street Safe Travel Corridor
Project Number	30043159T
File Location	\\filer.nasuni.local\SMECANZ\Projects\300431\30043159T\200 Transport Planning\Safe System Assessment
Revision Number	3

Revision History

Revision No.	Date	Prepared By	Reviewed By	Approved for Issue By
1	28 March 2022	Lachlan Beckworth Laura Procter	Andrew Backman	Andrew Backman
2	10 June 2022	Lachlan Beckworth Laura Procter	Andrew Backman	Andrew Backman
3	11 August 2023	Lachlan Beckworth Laura Procter	Andrew Backman	Andrew Backman

Issue Register

Distribution List	Date Issued	Number of Copies
City of Port Phillip	11 August 2023	1 x .pdf

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Executive Summary

This report presents the findings of a Safe System Assessment (SSA) for the Inkerman Street Safe Travel Corridor project. A Safe System Assessment (SSA) is a safety examination of a road-related program, project or initiative carried out using the Austroads Safe System Assessment Framework (AP-R509-16) with further reference to the VicRoads Safe System Assessment Guidelines (April 2019).

The Safe System approach is a road safety philosophy that requires roads to be designed and managed so that crash-related death and serious injury are minimised. This assessment compares how the Existing Conditions and the proposed Project Options align with Safe System Principles.

The Project Options broadly involve:

- Project Option 1 – Kerbside bicycle lanes with parking on one side;
- Project Option 2 – Kerbside bicycle lanes with parking on both sides;
- Project Option 3 – Kerbside parking on both sides with traffic-side bicycle lanes;
- Project Option 3A – Kerbside parking on both sides with traffic-side bicycle lanes (as per Option 3, but with reduced parking impacts); and
- Project Option 4 – Minor traffic calming and safety improvements.

Project Options 1 to 3A feature three mid-block pedestrian crossings, whilst Project Option 4 includes three raised pavement humps. All options include a speed reduction to 40km/h.

The Safe System Assessment is performed by evaluating the crash risk for seven different crash types (run-off-road, head-on, intersection, other, pedestrian, cyclist, and motorcyclist crashes). The evaluation involved quantifying the exposure, likelihood, and severity out of a score of 4 for these particular crash types by drawing on reference documents and experience. These scores are then multiplied to give a risk score (out of 64) for that particular crash type. These risk scores can then be summed to give a final Safe System Score for the design (out of 448). The lower the Safe System Score, the better the design aligns with Safe System principles – guiding pillars to drive Victorian road systems to achieving the Victorian goal of reducing lives lost on Victoria's roads by half before 2030.

This Safe System Assessment has explored the alignment of the Inkerman Street Safe Travel Corridor Project Option concept designs to Safe System principles. The assessment has shown the designs show an improvement in alignment with Safe System principles, indicating improved safety outcomes for all road users compared to existing conditions.

The Assessment scores for this Project are shown in Table 1 and Figure 1.

Table 1: Safe System scoring summary.

Project Section	Safe System Score (/448)
Existing Conditions	232
Project Option 1 – Kerbside bicycle lanes with parking on one side	123
Project Option 2 – Kerbside bicycle lanes with parking on both sides	134
Project Option 3 – Kerbside parking on both sides with traffic-side bicycle lanes	135
Project Option 3A – Kerbside parking on both sides with traffic-side bicycle lanes (as per Option 3, but with reduced parking impacts)	139.5
Project Option 4 – Minor traffic calming and safety improvements	175.5

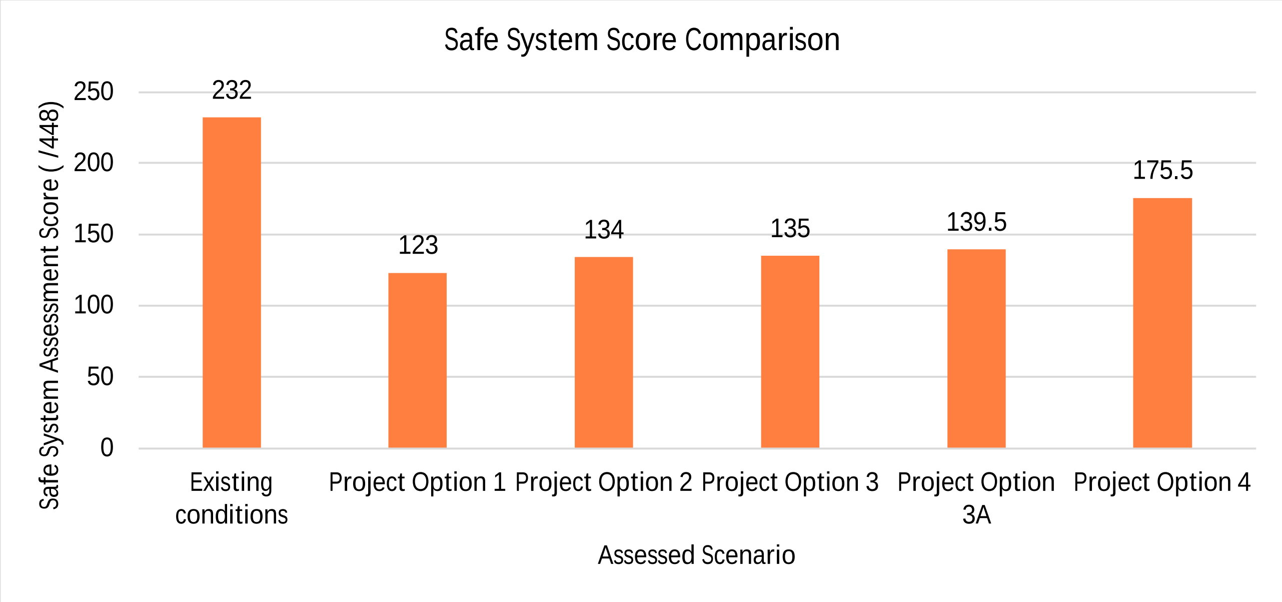


Figure 1: Safe System score comparison.

Figure 2 shows the Safe System product score for each crash category. This shows how the assessment team scored the crash categories for each Project Option and how the final Safe System score was derived.

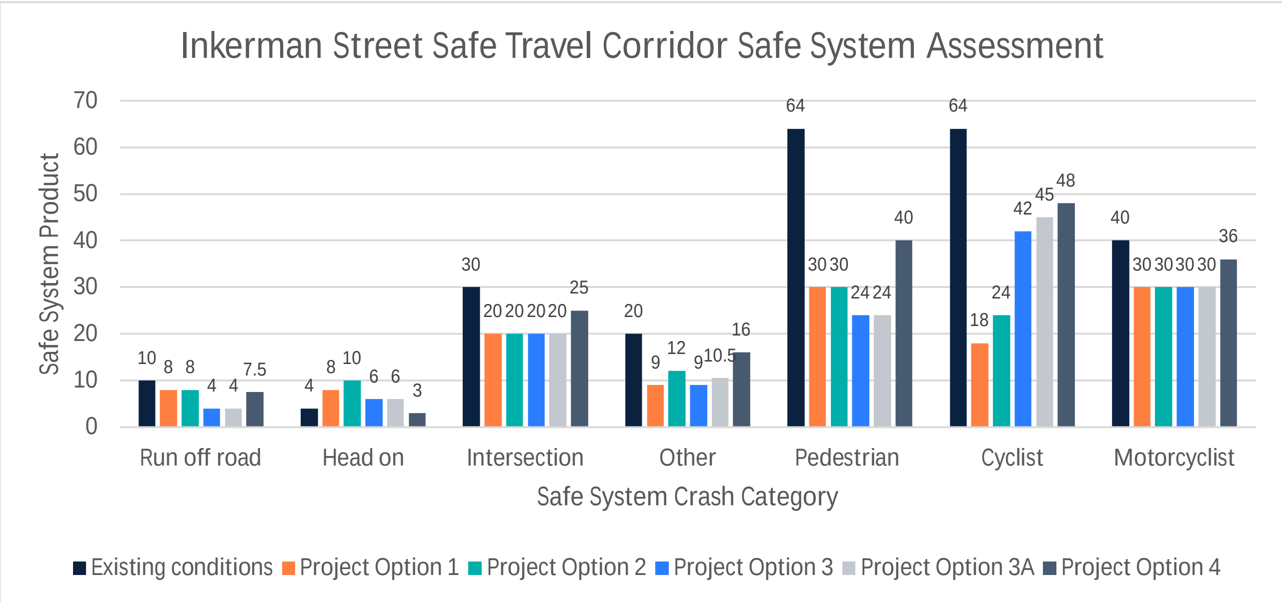


Figure 2: Safe System score comparison by crash type.

Grouped by travel mode, the safe system scores are shown in Figure 3. This shows how the project options change Safe System outcomes for the different modes for the corridor. To achieve the grouped score for Motor Vehicle, crash types have been aggregated and factored accordingly to provide a score out of 64.

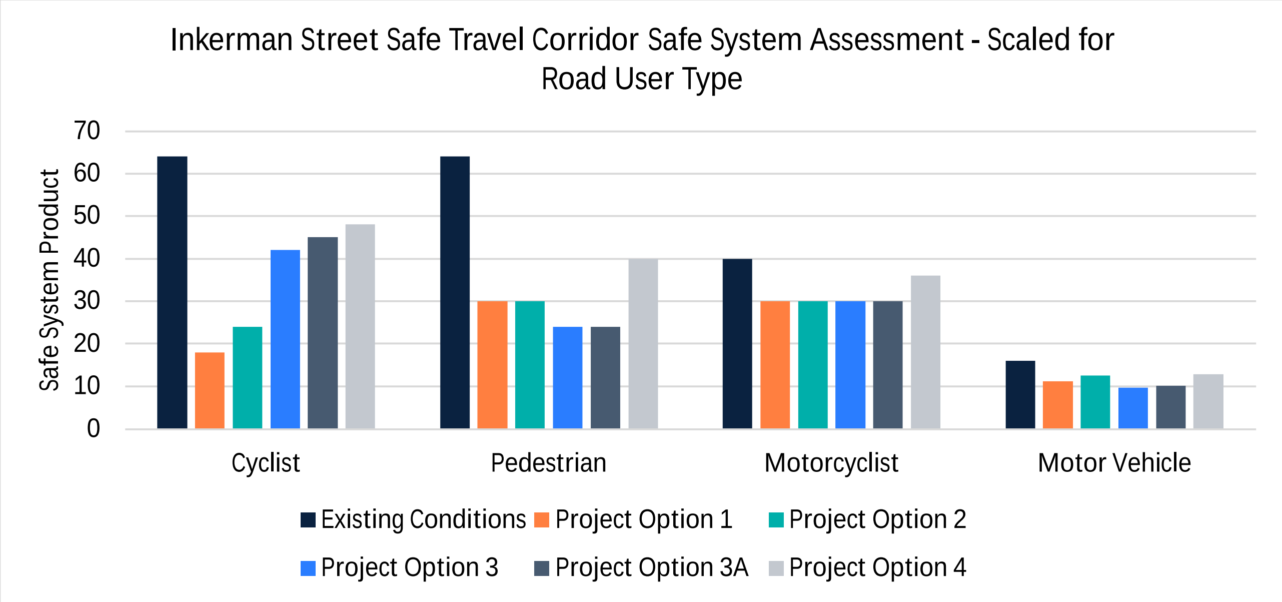


Figure 3: Safe System product score by road user crash type.

The scores indicate that Project Option 1 (kerbside bicycle lanes with parking on one side only) presents the best overall improvement in alignment with Safe System principles for Inkerman Street, followed by Project Option 2 and then Project Option 3, 3A and finally Project Option 4. Option 1 and 2 present comparable improvements for pedestrian safety. All options present an improvement for motorcyclist and motor vehicle safety.

Project Option 1 provides the best overall improvement in Safe System alignment for cyclists due to several reasons. These include the wide protected kerbside bicycle lanes, reduced speed limit for motorists, and the improved set-back alignment of the bicycle lanes past local side streets, allowing for vehicles entering and exiting the side streets to prop clear of the bicycle lane and give way to cyclists separate to the motorist’s turning movements at the intersection.

Project Option 4 presents the least overall improvement in Safe System alignment for cyclists, which is a key contributor in it achieving the worst product score of the 5 project options reviewed. For cyclists, contributing factors to the lower safety outcome include the lack of a physical buffer between the traffic lane and the bicycle lanes, and the need for vehicles performing parking manoeuvres to do so across the bicycle lanes.

Potential treatments that could further improve the project’s alignment with Safe System principles and achieve the Victorian Road Safety Strategy goal of reducing lives lost on Victoria’s roads by half before 2030 have been identified via the treatment hierarchy and are presented for consideration when moving forward with the designs. These include implementing turning movement bans at minor side roads, the inclusion of LED tactile ground surface indicators, and raised intersections.

Additional Safe System components are also explored with commentary. The Project Option schemes will largely cater for safer road users, safe vehicles, post-crash care, and maintenance.

Contents

Appendices

Figures

Tables

1. Introduction

The City of Port Phillip is seeking to improve the safety, amenity, and accessibility of Inkerman Street between St Kilda Road and Hotham Street. This report communicates the results of a Safe System Assessment (SSA) for the extent. A team of DoT recommended Safe System Assessors from SMEC's Traffic Engineering Team conducted the Assessment in alignment with Austroads Safe System Assessment Framework (AP-R509-16).

In line with the Austroads Guide, this report first contextualises the Assessment. Then, the second half presents the Safe System Matrix and a treatment hierarchy.

2. Project Details

The City of Port Phillip has engaged SMEC to develop a Safe Travel Corridor design for Inkerman Street. The delivery of the project will:

- Link Inkerman Street to the prominent St Kilda Road corridor;
- Make it easy for people to connect with place in an accessible, safe, comfortable, and convenient way;
- Cater for future precinct growth and improve flow to activity centres; and
- Raise cyclist and pedestrian safety significantly.

The subject length extends from St Kilda Road, St Kilda to Hotham Street, St Kilda East. Figure 4 below shows a locality plan and Figure 5 shows an aerial image of the corridor environment.

Figure 4: Locality plan (source: Google Maps).

Figure 5: Aerial Image (source: Metromap).

2.1 Project Context

The context behind the Inkerman Street Safe Travel Corridor project is detailed below. To ensure that each pillar of the Safe System is considered as part of this assessment, responses to Austroads AP-R509-16 'Setting the Context' prompts are provided in Table 2.

Table 2: Project context.

Context Element	Existing Conditions: Details and Data
Road Function & Features	• Inkerman Street – Council owned and managed local road – Oriented east-west – Two-lane, two-way, single carriageway, with wide painted median with several sections of constructed median islands – On street parallel parking – On-road bicycle lanes – Kerb and channel – Constructed footpaths to both sides – Between St Kilda Road and Chapel Street, Inkerman Street has a mix of residential and commercial frontages and provides access to many local roads. This section has a discount supermarket and a large residential presence including a twelve-storey community housing tower. – Between Chapel Street and Hotham Street, Inkerman Street has a mix of residential and commercial frontages. The commercial frontages in this extent are smaller but more numerous than the extent west of Chapel Street. This section also provides access to some small recreational areas either directly or through the nearby network, provides access to many local roads, and has some sections of unrestricted parking. • St Kilda Road – Department of Transport owned and managed arterial road – Oriented north-west to south-east – Up to 8 lanes, two-way, divided carriageway with median tram corridor – On street parallel parking – On-road bicycle lanes – Kerb and channel

<table>
<tr><th>Context Element</th><th>Existing Conditions: Details and Data</th></tr>
<tr><td></td><td>
– Sealed footpaths
– St Kilda Road is a primary state arterial road and forms part of State Route 3, connecting Frankston to Melbourne's CBD. St Kilda Road is a main transport link for Balaclava, St Kilda, Windsor, Prahran, South Yarra, and Melbourne's inner south into the city centre with a direct crossing of the Yarra River (Princes Bridge). It has mixed residential, commercial, and recreational uses.
• Chapel Street
– Council owned and managed local road
– Oriented north-south
– Two-lanes, two-way, undivided carriageway with tram corridor
– On street parallel parking
– On-road bicycle lanes
– Kerb and channel
– Concrete footpaths
– Chapel Street connects South Yarra with Balaclava. It has mixed residential, commercial, and entertainment land uses throughout. Near the intersection with Inkerman Street, it is mostly residential with some commercial (petrol station, milk bar, and coffee shop).
• Westbury Street
– Council owned and managed local road
– Oriented north-south
– Two-lane, two-way single carriageway
– On street parallel parking, with 45° parking on the south approach to Inkerman Street
– Wide painted median with several sections of median islands
– Kerb and channel
– Sealed footpaths
– Westbury Street connects Dandenong Road, Windsor to Carlisle Street, Balaclava. It is mainly used for residentially throughout. Near to Inkerman Street, there is a kindergarten 50m from the intersection.
• Hotham Street
– Department of Transport owned and managed arterial road
– Oriented north-south
– Two-lane, two-way, single carriageway (four lanes, two way during peak times)
– On street parallel parking
– Wide painted median
– Kerb and channel
– Concrete footpaths
– Hotham Street connects Dandenong Road to Nepean Highway. It has considerable residential frontage, with some commercial and recreational access, too.
</td></tr>
<tr><td>Vehicle Composition</td><td>
• Austraffic 2021, motor vehicle Automatic Tube Count (ATC) surveys[1]:
– Between Marriot Street and Henryville Street:
    – 11,660 vpd (total, two-ways, 7-day average)
    – 8.3% heavy vehicles (968 vpd) (total, two-ways, 7-day average)
    – 1.5% motorcycles (175 vpd)
– Between Malakoff Street and Leslie Street:
    – 12,340 vpd (total, two-ways, 7-day average)
    – 4.8% heavy vehicles (592 vpd) (total, two-ways, 7-day average)
    – 2.0% motorcycles (232 vpd)
</td></tr>
</table>

[1] Survey was conducted between Friday 10/12/2021 and Thursday 16/12/2021.

Context Element	Existing Conditions: Details and Data
Speed Environment	• Inkerman Street – 50 km/h existing; 40km/h proposed – This is similar to other nearby local roads. Side streets off Inkerman Street throughout the extent are signed for 40km/h. Major side streets Chapel Street and Hotham Street are signed for 50km/h and 60km/h respectively. St Kilda Road is signed for 60km/h.
Road Users	• Austraffic 2021, pedestrian and cyclist mid-block counts[2] – Between Bath Street and Henryville Street: – Pedestrians: 892 No. per day crossing Inkerman Street – Cyclists: two-way on-road volume of 243 No. per day along Inkerman Street – Between Raglan Street and Nelson Street: – Pedestrians: 380 No. per day crossing Inkerman Street – Cyclists: two-way on-road volume of 267 No. per day along Inkerman Street • Signalised pedestrian crossings are provided at signalised intersections, however mid-block crossing is limited to informally using the median islands (painted and constructed)
Crash History	A total of 34 casualty crashes were recorded for the Inkerman Road corridor over the past 5 years. The below points summarise the crashes by Safe System crash type. • Run-off Road: 3 crashes including: – Left Off Carriageway into Object/Parked Car (DCA 171): 1 x Serious Injury – Parked (DCA 160) (then ran-off-road): 1 x Other Injury – Out of Control on Carriageway (DCA 174): 1 x Other Injury • Head-On: – No recorded crashes • Intersection: 8 crashes including: – Right Through (DCA 121): 2 x Other Injury, 1 x Serious Injury – Cross Traffic (DCA 110): 1 x Serious Injury – Right Near (DCA 113): 1 x Other Injury – Left Through (DCA 122): 1 x Other Injury – Lane Change Right (Not Overtaking) (DCA 134):1 x Other Injury – Left Turn Side Swipe (DCA 137): 1 x Other Injury • Other: 7 crashes including: – Rear End (DCA 130): 2 x Other Injury, 2 x Serious Injury – Right End (DCA 132) 1 x Other Injury – Other Same Direction (DCA 139): 1 x Other Injury – Emerging from Driveway/Lane (DCA 147): 1 x Other Injury • Pedestrian: 14 crashes including: – Near Side (DCA 100): 4 x Other Injury, 6 x Serious Injury – Far Side (DCA 102): 2 x Other Injury – Emerging (DCA 101): 1 x Serious Injury – Playing, Working, Laying, Standing on Carriageway (DCA 103): 1 x Other Injury • Cyclist: 10 crashes including: – Vehicle Door (DCA 163): 1 x Other Injury, 1 x Serious Injury – Rear End (DCA 130): 1 x Serious Injury – Right Through (DCA 121): 2 x Other Injury – Left Through (DCA 122): 1 x Other Injury – Lane Change Right (Not Overtaking) (DCA 134): 1 x Other Injury – Left Turn Side Swipe (DCA 137): 1 x Other Injury

[2] Pedestrian and cyclist counts were taken on Thursday 25/11/2021 and Saturday 27/11/2021 and the volumes presented are an average of these days.

Context Element	Existing Conditions: Details and Data
	– Other Same Direction (DCA 139): 1 x Other Injury – Out of Control of Carriageway (DCA 174): 1 x Other Injury • Motorcyclist: 2 crashes including: – Right Through (DCA 121): 1 x Serious Injury – Emerging from Driveway/Lane (DCA 147): 1 x Other Injury • St Kilda Road and Inkerman Street intersection has a five-year history of 7 crashes with no significant trend. • Chapel Street and Inkerman Street intersection has a five-year history of 5 crashes including 3 pedestrian Near Side crashes (DCA 100). • Westbury Street and Inkerman Street intersection has a five-year history of 5 crashes including 4 pedestrian Near Side crashes (DCA 100). • Hotham Street and Inkerman Street intersection has a five-year history of 4 crashes including 2 pedestrian Near Side crashes (DCA 100). • The full crash history details and crash diagrams at key intersections can be found in Appendix A.

2.2 Project Options

Several concept options have been developed to achieve the above project objectives. They are described in the following sections. Concept plans that were used for this assessment are presented in Appendix B.

2.2.1 Option 1 – Kerbside bicycle lanes with parking on one side

Project Option 1 proposes 2.2m protected kerbside bicycle lanes and 3.0m traffic lanes. Parking is available on one side of the carriageway on the traffic side of the protected bicycle lane. There is a 0.6m linemarked buffer between the parking lane and the traffic lane. The buffer that will separate parking from the bicycle lane is 1.0m wide whereas the buffer to the bicycle lane on the side with no parking will be 0.3m. The existing verge widths and footpaths are unaffected. There are three proposed mid-block pedestrian crossings. A 40km/h speed limit is proposed for the length of the study area.

Figure 6 shows the proposed cross-section.

Figure 6: Option 1 proposed cross-section (source: Streetmix).

2.2.2 Option 2 – Kerbside bicycle lanes with parking on both sides

Project Option 2 proposes 1.3m protected kerbside bicycle lanes and 3.0m traffic lanes. Parking is available on both sides of the carriageway on the traffic side of the protected bicycle lanes. The buffers between the parking lane and bicycle lane will be 0.8m on both sides, consisting of 0.3m kerb and 0.5m chevron markings. The existing verge widths and footpaths are unaffected. Three mid-block pedestrian crossings are also proposed for Option 2. A 40km/h speed limit is proposed for the length of the study area.

Figure 7 shows the proposed cross-section.

Figure 7: Option 2 proposed cross-section (source: Streetmix).

2.2.3 Option 3 – Kerbside parking on both sides with traffic-side bicycle lanes

Project Option 3 proposes 1.2m cycling lanes located between the parking and traffic lanes, protected by a 0.4-0.5m painted buffer, and 3.0m traffic lanes in each direction. Parking is available kerbside on both sides of the carriageway. The existing verge widths and footpaths are unaffected. Three mid-block pedestrian crossings are also proposed for Option 3. A 40km/h speed limit is proposed for the length of the study area.

Figure 8 shows the proposed cross-section.

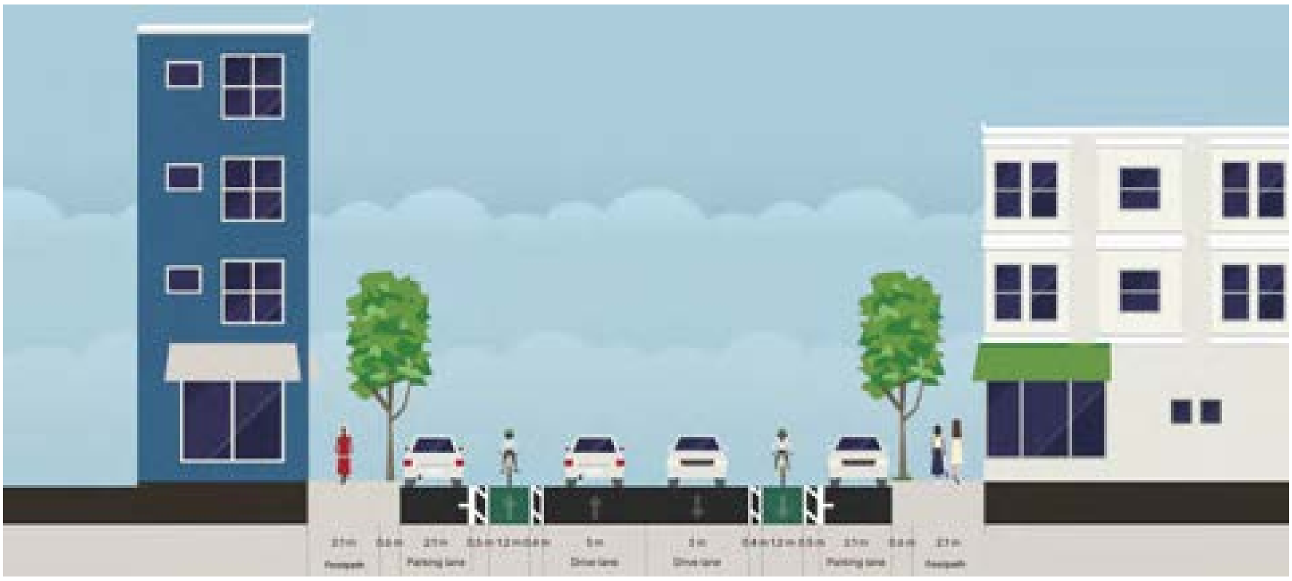


Figure 8: Option 3 proposed cross-section (source: Streetmix).

2.2.4 Option 3A – As per Option 3, but with reduced parking impacts

As with Project Option 3, Project Option 3A proposes 1.2m cycling lanes located between the parking and traffic lanes, protected by a 0.4-0.5m painted buffer, and 3.0m traffic lanes in each direction. Parking is available kerbside on both sides of the carriageway. The existing verge widths and footpaths are unaffected. Three mid-block pedestrian crossings are also proposed for Option 3A. A 40km/h speed limit is proposed for the length of the study area.

The key differences between Project Option 3 and Project Option 3A are:

- Some existing parking spaces are retained in Project Option 3A which were proposed to be removed in Option 3. These parking spaces are generally either slightly substandard in length when considered against the Planning Scheme and Australian Standards requirements or are located in close proximity to intersections and had been marked for removal to provide cyclists with better facilities on the approach and departure to intersections.
- Option 3A in some locations on the approach or departure to intersections has additional green paint proposed to highlight the presence of the bicycle lane.
- Option 3A does not provide a dedicated westbound cyclist facility at the departure from the intersection of Hotham Street, with the on-road lane commencing west of Chusan Street.

2.2.5 Option 4 – Minor traffic calming and safety improvements

Project Option 4 proposes to retain the existing cross section of Inkerman Street which includes 1.5-1.7m cycling lanes located between the parking and traffic lanes, and 2.7-2.9m traffic lanes in each direction, separated by a 1.7-1.8m median island. Parking is available kerbside on both sides of the carriageway. The existing verge widths and footpaths are unaffected. Changes include:

- 40km/h speed zone.
- Raised pavements at 3 x mid-block locations.
- All minor side streets: linemarked kerb outstands and green pavement highlighting the bicycle lane.
- Nelson Street / Raglan Street: constructed kerb outstands and green pavement highlighting the bicycle lane, plus raised threshold treatments on minor road approaches.

3. Introduction to the Safe System

The Safe System is a road safety philosophy that requires roads to be designed and managed so that death and serious injury are avoidable. The basic principles are:

- Humans are fallible, and will inevitably make mistakes when driving, riding or walking.
- Despite this, road trauma should not be accepted as inevitable. No one should be killed or seriously injured on our roads.
- To prevent serious trauma, the road system must be forgiving, so that the forces of collisions do not exceed the limits that the human body can tolerate.

The Safe System philosophy underpins Victoria's strategic approach to road safety. It is divided into four core interrelated pillars, as well as a fifth pillar, post-crash response, which has been identified by the World Health Organisation (2011) as shown in Figure 9:

- Safer Roads: Relates to both the road itself and the roadside. This considers ways to reduce the chance of a crash occurring as well as the consequence when one does occur.
- Safer Speeds: Relates to the speed at which vehicles are likely to travel on the road. Factors that influence operating speeds includes posted speed limits, the level of compliance with the speed limit and physical constraints. Unsafe speeds can increase both likelihood and consequence of a crash.
- Safer Vehicles: Relates to the safety features, including intelligent technologies that are incorporated into vehicles of different types, which contribute to crash avoidance and/or reduced crash severity.
- Safer Road Users: Relates to road user behaviour, driver/rider training and licensing, levels of compliance and personal safety equipment in the case of vulnerable road users such as cyclists and motorcyclists.
- Post-Crash Care: Relates to emergency medical and rescue response, trauma care (both at the scene and in hospital) and injury rehabilitation.

The Safe System approach will assist in achieving the Victorian Road Safety Strategy goal of reducing lives lost on Victoria's roads by half before 2030. The goal supports a larger ambition of eliminating all road crash related deaths by 2050.

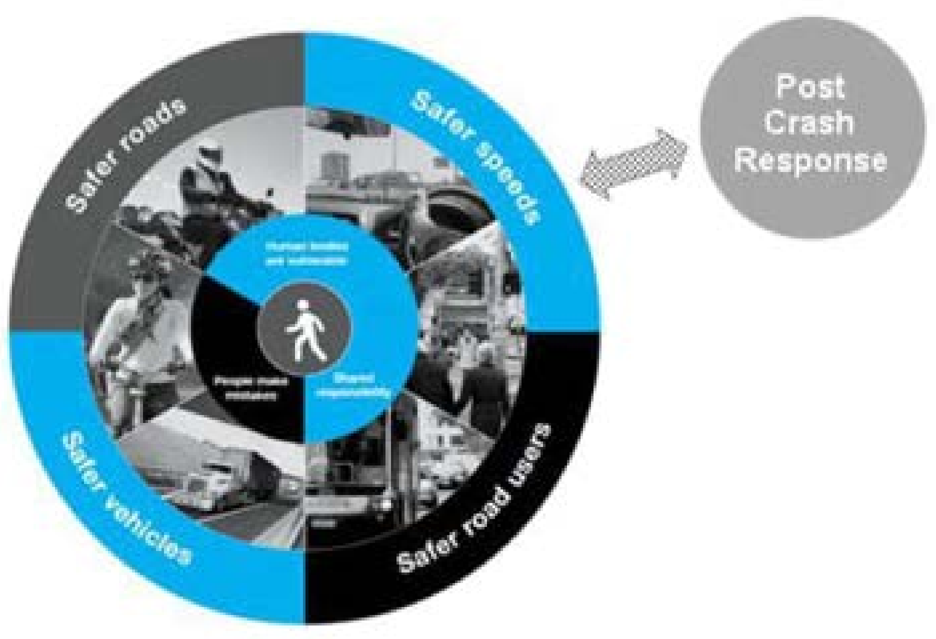


Figure 9: The Safe System (source: VicRoads Safe System Assessment Guidelines July 2018).

4. Assessment Details

4.1 Safe System Assessment Type

There are two levels of detail to consider when undertaking an SSA: A Full Assessment or Rapid Assessment. The choice of assessment depends principally upon the size and complexity of the project.

The City of Port Phillip have engaged SMEC undertake a Full SSA for this project to assess the existing conditions and assist optioneering in line with Safe System Principles.

Components of a Full SSA, as per the Safe System Assessment Framework, include:

- Commencement meeting;
- Setting the Project Background & Context;
- Site inspection/s;
- Assessment of existing conditions and design options using the Safe System Matrix;
- Consideration of other Safe System pillars;
- Identification of additional Safe System components that may influence safety outcomes; and
- Identification of possible design changes to improve alignment with Safe System principles.

4.2 Commencement Meeting

SMEC's Traffic and Engineering Team initially met on 11/03/2022 and discussed the project background/context and objectives. The team discussed the design options, existing conditions, traffic volumes, and crash history with the Project Manager.

To consider the two new project options, SMEC's team met on 24/07/2023 and discussed the design elements and inclusions/exclusions for Option 3A and Option 4.

4.3 Assessment Team

This Safe System Assessment was conducted by a team of engineers from SMEC's Traffic Engineering team, including:

- Laura Procter, Team Leader – Transport Planning & Advisory; and
- Lachlan Beckworth, Transport Engineer.

Laura is a Department of Transport Recommended Safe System Assessor and accredited Senior Road Safety Auditor. Lachlan is a Department of Transport accredited Road Safety Auditor.

The process has been overseen by SMEC's Project Manager for the Inkerman Street Safe Travel Corridor Project, Andrew Backman. Andrew is a Department of Transport Recommended Safe System Assessor and accredited Senior Road Safety Auditor.

4.4 Site Inspection

SMEC undertook a site inspection to better understand the existing conditions along the subject corridor. The site was inspected on Tuesday the 16th of March 2022. The weather was clear and dry. Site photos can be found in Appendix C.

4.5 The Safe System Matrix

The Safe System matrix is used to assess different major crash types (those identified as the predominant contributors to fatal and serious crash outcomes) against the exposure to that crash risk, the likelihood of it occurring and the severity of the crash should it occur. These three attributes form the rows of the matrix.

The columns of the Safe System matrix show the crash types that represent the main crash and road user types that contribute to fatal and serious injury crashes. They are included as an element of the matrix to help concentrate thinking on crash causes and solutions. They are also provided in this way to ensure that vulnerable road users are directly considered.

The seven major crash types as shown in the matrix columns are:

- Run-off-road (also referred to as ‘loss of control’, or ‘off path on curve/straight’);
- Head-on (or ‘vehicles from opposing directions’);
- Intersection (‘vehicles from adjacent directions’);
- Other (this incorporates other crash types which are relevant to the site or project such as same direction, manoeuvring, overtaking, on path and miscellaneous crashes);
- Pedestrian;
- Cyclist; and
- Motorcyclist.

4.6 The Approach to Safe System Scoring

The Safe System Matrix is used to assess the extent to which project options align with Safe System principles. This is achieved through a scoring system which considers seven crash grouping types and the exposure, likelihood and severity associated with each crash type. Each combination is assigned a score from zero to four (0-4). Guidance on scoring is provided in Austroads Safe System Assessment Framework. A summary table of scoring is provided in Table 3. Commentary on factors that either increase or decrease the risk is provided for each cell of the matrix to provide reasoning for the assigned score.

The scores for exposure, likelihood and severity are multiplied together for a given crash type to provide a value for the crash type. Each crash type score is summed to give a total score for the assessed item. The lower the overall score, the better aligned the item is to Safe System principles. The aim of the Safe System matrix is to reduce the total score towards zero.

Table 3: Safe System assessment matrix scoring guide.

Score	Exposure	Crash Likelihood	Crash Severity
0	No Exposure	Minimal Chance	Minimal chance of Fatal or Serious Injury (FSI)
1	Low Volumes	Highly Unlikely	Highly unlikely chance of FSI
2	Moderate Volumes	Unlikely	Unlikely chance of FSI
3	High Volumes	Likely	Likely chance of FSI
4	Very High Volumes	Highly Likely	Highly likely chance of FSI

5. Safe System Assessment

5.1 Existing Conditions

Table 4 below shows the SSA scoring matrix for the existing conditions.

Table 4: Existing Conditions Safe System Assessment matrix.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For head-on crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For intersection crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For 'other' crash types (including rear-end, side swipes, and parking related crashes), AADT is >10,000 vehicles per day (Austroads trigger).	There are significant pedestrian traffic generators at the site. Pedestrian volumes are > 100 units per day (Austroads trigger).	The site is a significant cycling corridor and connects to other major cycling corridors. Cyclist volumes are > 100 units per day (Austroads trigger).	For motorcyclist crash types, volumes are >100 units per day (Austroads trigger).
	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Likelihood	Factors that *increase* the likelihood include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • Moderate traffic speeds. • Narrow traffic lanes, median trees may push motorists across towards kerbside. • Evasive manoeuvres due to high pedestrian volumes, with pedestrians crossing from between parked cars and across median. Factors that *decrease* the likelihood include: • Single lane in each direction negates possibility of a crash from lane changing and avoids evasive action (run-off-road) from lane changing. • Long and straight alignment. • Bicycle and parking lane gives room to recover. • Low potential for driver fatigue due to regular requirement for driver response (signalised intersections).	Factors that *increase* the likelihood include: • Regular sections where the median is painted rather than a physical separator. Factors that *decrease* the likelihood include: • No history of Head-On type crashes in the past 5 years. • Median island (painted and constructed) separates streams of traffic. • Long and straight alignment. • No overtaking opportunities. • Moderate traffic speeds.	Factors that *increase* the likelihood include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years, including: – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Chapel Street intersection. – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and Hotham Street intersection. • Moderate complexity of Inkerman Street and Chapel Street intersection due to presence of trams. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections. • Presence of regular local side streets and crossovers. • Kerbside car parking may limit sight lines at some crossovers making oncoming traffic difficult to see. Factors that *decrease* the likelihood include: • No Other Injury or Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. • Fully controlled turning movements at the signalised	Factors that *increase* the likelihood include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years of these crash types, including: – 3 x Other Injury and 2 x Serious Injury Rear-End type crashes; – 1 x Emerging from Driveway/Lane crash; and – 1 x Other Injury crash involving aggressive criminal behaviour between a cyclist and a motor vehicle. • The median is not wide enough to contain a typical car. Other motorists may attempt to drive around turning traffic where there is not enough width which may cause rear-end and side swipe crashes. • Presence of regular local side streets and crossovers. • Kerbside car parking may decrease sight lines at some property accesses for emerging traffic, making main road traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane • The provision of parallel parking may lead to side swipe crashes with parked cars when drivers attempt to park given the narrow parking space (2m), bike lane (1.6m), and narrower traffic lanes (2.8m). Factors that *decrease* the likelihood include: • Moderate speeds enable shorter stopping distances.	Factors that *increase* the likelihood include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years, including: – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 2 x Other Injury and 1 x Serious Injury crashes in the past 5 years at the Inkerman Street and Chapel Street intersection. – 1 x Other Injury and 3 x Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Hotham Street intersection. • Signalised crossings are far apart (450m) which are likely to encourage pedestrians to cross midblock. • High volumes of mid-block crossing observed during site inspection. • Kerb outstands in some locations reduce the crossing distance for pedestrians. • The painted median may give some pedestrians a false sense of safety as there are long extents without raised island protection and the median is narrow (approximately 1.6m). • Presence of regular local side streets and crossovers.	Factors that *increase* the likelihood include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Bicycle lanes are on-road and traffic-side. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming bicycle traffic. • The start and termination of bicycle lanes at St Kilda Road (east approach and departure) and Chapel Street forces cyclists to merge with motorists. The likelihood of a crash increases further at Chapel Street during 'no-stopping' times as lane separation line marking is poor on the approaches. • The start and termination of bicycle lanes at Hotham Street forces cyclists to merge with motorists. • 1.9m-wide kerbside car parking with no offset to 1.6m bicycle lanes and 2.8m traffic lanes increases the likelihood of car-dooring crashes. • The median is not wide enough to store a propped car. Other motorists may attempt to drive around turning traffic where there is not enough width and may strike a cyclist. • Kerbside car parking increases the likelihood of a crash involving a cyclist as motorists	Factors that *increase* the likelihood include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming motorcycle traffic. Factors that *decrease* the likelihood include: • Moderate speeds enable shorter stopping distances • Traffic lane surface is clear of destabilising objects (speed bumps, utility pit lids, surface defects). • Long, straight, and flat corridor provides stable road geometry (for through traffic only).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
			intersection of Inkerman Street and St Kilda Road. • Dedicated right turn lanes at Chapel Street, Westbury Street, and Hotham Street intersections lowers complexity of intersections. • Signalisation of high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street). • Moderate speeds enable shorter stopping distances.		• Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street signalised intersection may increase the likelihood of crashes involving pedestrians as turning traffic may fail to appropriately give-way. Factors that *decrease* the likelihood include: • Signalisation of the high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street) including pedestrian crossings. • Provision of median island refuges raise awareness for motorists and cyclists of crossing pedestrians. • Raised platform crossings and surface treatments at minor side streets between St Kilda Road and Chapel Street promote awareness of pedestrians for turning traffic. • Long and straight corridor with median where pedestrians may store may provide adequate sight distances if pedestrians choose appropriate gaps to cross which may grant improved response time. • Moderate speeds enable shorter stopping distances.	must cross over the bicycle lanes to park. • Turning motor traffic must turn across bicycle lanes. • Kerbside car parking may decrease sight lines at some property accesses and side streets for entering traffic, making oncoming traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane. • Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections. Factors that *decrease* the likelihood include: • Bicycle lane surface treatments increase awareness of cyclists at some conflict points. • Cyclist storage boxes at the signalised intersections allow cyclists to be seen, progress through the conflict points faster, and separates cyclists from motorist traffic. • Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections may only attract confident riders/may discourage less confident riders from the route. • Long and straight corridor may provide adequate sight distances to cyclists ahead, granting improved response time. • Moderate speeds enable shorter stopping distances.	
	1/4	1/4	3/4	2.5/4	4/4	4/4	2.5/4
Severity	Side impacts with fixed objects at speeds greater than 30km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • Moderate 50km/h speed limit. • Many fixed objects on the roadside – poles, trees, and roadside furniture. Factors that *decrease* the severity include:	Impacts with an oncoming vehicle at speeds greater than 70km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • None Factors that *decrease* the severity include: • Median treatment grants more time for vehicles to reduce speeds (energy). • Moderate 50km/h speed limit.	Side on impacts with a vehicle at speeds greater than 50km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • High impact angles at all intersections. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street	Factors that *increase* the severity include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years. Factors that *decrease* the severity include: • Same direction nature of Other crash types. • Moderate speeds reduce impact energy.	Pedestrians struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/pedestrian crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h).	Cyclists struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/cyclist crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h).	Due to the vulnerability of motorcyclists, a crash between a motorcycle and a roadside hazard or parked car is likely to result in serious trauma unless speeds are very low. Factors that *increase* the severity include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • High impact angles between errant motorcyclists and fixed roadside hazards (trees, poles, and structures).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	• Some room to recover within bicycle and parking lane.		intersections exposes vehicles to high impact angles. • Trams on Chapel Street introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Moderate speeds reduce impact energy.		• Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • None.	• Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • None	• Trams on Chapel Street can introduce more energy into a crash than a typical car. • Moderate 50km/h speed limit. Factors that *decrease* the severity include: • None.
	2.5/4	1/4	2.5/4	2/4	4/4	4/4	4/4
Product	10/64	4/64	30/64	20/64	64/64	64/64	40/64
Total							232/448

5.2 Project Option 1

Table 5 below shows the SSA scoring matrix for Project Option 1 – kerbside bicycle lanes with parking on one side.

Table 5: Project Option 1 Safe System Assessment matrix.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For head-on crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For intersection crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For 'other' crash types (including rear-end, side swipes, and parking related crashes), AADT is >10,000 vehicles per day (Austroads trigger).	There are significant pedestrian traffic generators at the site. Pedestrian volumes are > 100 units per day (Austroads trigger).	The site is a significant cycling corridor and connects to other major cycling corridors. Cyclist volumes are > 100 units per day (Austroads trigger).	For motorcyclist crash types, volumes are >100 units per day (Austroads trigger).
	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Likelihood	Factors that *increase* the likelihood include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate~~ Low traffic speeds. • ~~Narrow traffic lanes, median trees may push motorists across towards kerbside.~~ • ~~Evasive manoeuvres due to high pedestrian volumes, with pedestrians crossing from between parked cars and across median.~~ Factors that *decrease* the likelihood include: • Single lane in each direction negates possibility of a crash from lane changing and avoids evasive action (run-off-road) from lane changing. • Long and straight alignment. • ~~Bicycle and~~ parking lane gives room to recover. • Low potential for driver fatigue due to regular requirement for driver response (signalised intersections and raised pedestrian crossings). • Dedicated pedestrian crossing points reduces informal pedestrian crossing and potential for evasive manoeuvres and loss of control type crashes.	Factors that *increase* the likelihood include: • ~~Regular sections where the median is painted rather than a physical separator.~~ • No physical separation between opposing traffic lanes. Factors that *decrease* the likelihood include: • No history of Head-On type crashes in the past 5 years. • ~~Median island (painted and constructed) separates streams of traffic.~~ • Long and straight alignment. • ~~No overtaking opportunities.~~ • ~~Moderate~~ Low traffic speeds.	Factors that *increase* the likelihood include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years, including: – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Chapel Street intersection. – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and Hotham Street intersection. • Moderate complexity of Inkerman Street and Chapel Street intersection due to presence of trams. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections. • High right turn volumes at the Chapel Street and Inkerman Street intersection. • Presence of regular local side streets and crossovers. • ~~Kerbside~~ On-street car parking may limit sight lines at some crossovers, making oncoming traffic difficult to see. Factors that *decrease* the likelihood include: • No Other Injury or Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. • Fully controlled turning movements at the intersection	Factors that *increase* the likelihood include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years of these crash types, including: – 3 x Other Injury and 2 x Serious Injury Rear-End type crashes; – 1 x Emerging from Driveway/Lane crash; and – 1 x Other Injury crash involving aggressive criminal behaviour between a cyclist and a motor vehicle. • ~~The median is not wide enough to contain a typical car. Other motorists may attempt to drive around turning traffic where there is not enough width which may cause rear-end and side swipe crashes.~~ • Presence of regular local side streets and crossovers. • ~~Kerbside~~ car parking may decrease sight lines at some property accesses for emerging traffic, making main road traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane. • ~~The provision of parallel parking may lead to side swipe crashes with parked cars when drivers attempt to park given the narrow parking space (2m), bike lane (1.6m), and narrower traffic lanes (2.8m).~~ Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances. • Provision of 0.6m buffer between parking lane and traffic lane.	Factors that *increase* the likelihood include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years, including: – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 2 x Other Injury and 1 x Serious Injury crashes in the past 5 years at the Inkerman Street and Chapel Street intersection. – 1 x Other Injury and 3 x Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Hotham Street intersection. • ~~Signalised crossings are far apart (450m) which are likely to encourage pedestrians to cross midblock.~~ • High volumes of mid-block crossing observed during site inspection. • ~~Kerb outstands in some locations reduce the crossing distance for pedestrians.~~ • ~~The painted median may give some pedestrians a false sense of safety as there are long extents without raised island protection and the median is narrow (approximately 1.6m).~~ • Presence of regular local side streets and crossovers • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street signalised	Factors that *increase* the likelihood include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Bicycle lanes are on-road~~-and traffic-side.~~ • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming bicycle traffic. • ~~The start and termination of bicycle lanes at St Kilda Road (east approach and departure) and Chapel Street forces cyclists to merge with motorists. The likelihood of a crash increases further at Chapel Street during 'no-stopping' times as lane separation line marking is poor on the approaches.~~ • ~~The start and termination of bicycle lanes at Hotham Street forces cyclists to merge with motorists.~~ • ~~1.9m-wide kerbside car parking with no offset to 1.6m bicycle lanes and 2.8m traffic lanes increases the likelihood of car-dooring crashes.~~ • ~~The median is not wide enough to store a propped car. Other motorists may attempt to drive around turning traffic where there is not enough width and may strike a cyclist.~~ • ~~Kerbside car parking increases the likelihood of a crash involving a cyclist as motorists must cross over the bicycle lanes to park.~~	Factors that *increase* the likelihood include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming motorcycle traffic. Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances • ~~Traffic lane surface is clear of destabilising objects (speed bumps, utility pit lids, surface defects).~~ • Long, straight, and flat corridor provides stable road geometry (for through traffic only).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
			of Inkerman Street and St Kilda Road. • Dedicated right turn lanes at Chapel Street, Westbury Street, and Hotham Street intersections lowers complexity of intersections. • Signalisation of high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street). • Kerb outstand treatments at minor road intersections will pull the minor road approach vehicle forward, enabling better visibility of all traffic along Inkerman Street. • ~~Moderate~~ Low speeds enable shorter stopping distances.	• Parking on one side of the carriageway only. • Consistency in the number and configuration of traffic lanes at the signalised intersections may reduce the likelihood of late lane changing.	intersection may increase the likelihood of crashes involving pedestrians as turning traffic may fail to appropriately give-way. • Given the 2.2m wide cycling lane, pedestrians may have some difficulty judging cyclist approach speed and required crossing time. Factors that *decrease* the likelihood include: • Signalisation of the high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street) including pedestrian crossings. • ~~Provision of median island refuges raise awareness for motorists and cyclists of crossing pedestrians.~~ • Raised platform crossings and surface treatments at minor side streets between St Kilda Road and Chapel Street promote awareness of pedestrians for turning traffic. • Long and straight corridor ~~with median where pedestrians may store~~ may provide adequate sight distances ~~if pedestrians choose appropriate gaps to cross~~ which may grant improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances. • Provision of convenient raised pedestrian crossings throughout the scheme raises awareness of crossing pedestrians and calms traffic. • Parking lane presents as a storage area for pedestrians where there is no parking and reduces the crossing distance. • Attentional linemarking on approach to pedestrian crossings. • Flashing lights on approach to pedestrian crossings. • Modified kerb outstands give pedestrians wide storage room for staging crossing across cycling and traffic lane.	• Turning motor traffic must turn across bicycle lanes. • ~~Kerbside~~ car parking may limit sight lines at some crossovers for entering traffic, making oncoming traffic difficult to see. • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections.~~ Factors that *decrease* the likelihood include: • Bicycle lane surface treatments increase awareness of cyclists at some conflict points. • Cyclist storage boxes at the signalised intersections allow cyclists to be seen, progress through the conflict points faster, and separates cyclists from motorist traffic. • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections may only attract confident riders/may discourage less confident riders from the route.~~ • Long and straight corridor may provide adequate sight distances to cyclists ahead, granting improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances. • Provision of wide (2.2m), separated bicycle lanes. • Lack of parking on one side of the road improves sighting of cyclists for vehicles emerging from property accesses and side streets. • Modified kerb outstands at some side roads navigate cyclists behind intersection traffic.	
	1/4	2/4	2.5/4	1.5/4	2.5/4	1.5/4	2.5/4

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Severity	Side impacts with fixed objects at speeds greater than 30km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate 50km/h~~ Low 40km/h speed limit. • Many fixed objects on the roadside – poles, trees, and roadside furniture. Factors that *decrease* the severity include: • Some room to recover within ~~bicycle and~~ parking lane.	Impacts with an oncoming vehicle at speeds greater than 70km/h are likely to cause death or serious injury. Factors that *increase* the severity include: ~~• None~~ • No physical separation between opposing traffic lanes limits available width for braking. Factors that *decrease* the severity include: ~~• Median treatment grants more time for vehicles to reduce speeds (energy).~~ • ~~Moderate 50km/h~~ Low 40km/h speed limit.	Side on impacts with a vehicle at speeds greater than 50km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • High impact angles at all intersections. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections exposes vehicles to high impact angles. • Trams on Chapel Street introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • ~~Moderate~~ Low speeds reduce impact energy.	Factors that *increase* the severity include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years. Factors that *decrease* the severity include: • Same direction nature of Other crash types. • ~~Moderate~~ Low speeds reduce impact energy.	Pedestrians struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/pedestrian crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h). • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Lowered 40km/h speed limit. • Modified kerb outstand arrangement with elevated pedestrian paths reduces pedestrian-motor vehicle crash energy.	Cyclists struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/cyclist crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h) • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Lowered 40km/h speed limit. • Modified kerb outstand arrangement with elevated cyclist paths reduces cyclist-motor vehicle crash energy.	Due to the vulnerability of motorcyclists, a crash between a motorcycle and a roadside hazard or parked car is likely to result in serious trauma unless speeds are very low. Factors that *increase* the severity include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • High impact angles between errant motorcyclists and fixed roadside hazards (trees, poles, and structures). • Trams on Chapel Street can introduce more energy into a crash than a typical car. ~~• Moderate 50km/h speed limit.~~ Factors that *decrease* the severity include: • Lowered 40km/h speed limit.
	2/4	1/4	2/4	1.5/4	3/4	3/4	3/4
Product	8/64	8/64	20/64	9/64	30/64	18/64	30/64
Total							123/448

5.3 Project Option 2

Table 6 below shows the SSA scoring matrix for Project Option 2 – kerbside bike lanes with parking on both sides.

Table 6: Project Option 2 Safe System Assessment matrix.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For head-on crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For intersection crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For 'other' crash types (including rear-end, side swipes, and parking related crashes), AADT is >10,000 vehicles per day (Austroads trigger).	There are significant pedestrian traffic generators at the site. Pedestrian volumes are > 100 units per day (Austroads trigger).	The site is a significant cycling corridor and connects to other major cycling corridors. Cyclist volumes are > 100 units per day (Austroads trigger).	For motorcyclist crash types, volumes are >100 units per day (Austroads trigger).
	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Likelihood	Factors that *increase* the likelihood include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate~~ Low traffic speeds. • ~~Narrow traffic lanes, median trees may push motorists across towards kerbside.~~ • Evasive manoeuvres due to high pedestrian volumes~~, with pedestrians crossing from between parked cars and across median.~~ Factors that *decrease* the likelihood include: • Single lane in each direction negates possibility of a crash from lane changing and avoids evasive action (run-off-road) from lane changing. • Long and straight alignment. • ~~Bicycle and~~ parking lane gives room to recover. • Low potential for driver fatigue due to regular requirement for driver response (signalised intersections). • Dedicated pedestrian crossing points reduces informal pedestrian crossing.	Factors that *increase* the likelihood include: • ~~Regular sections where the median is painted rather than a physical separator.~~ • Painted buffer next to parking lane may increase the shy-line and push vehicles further into the centre of the carriageway. Factors that *decrease* the likelihood include: • No history of Head-On type crashes in the past 5 years. • ~~Median island (painted and constructed) separates streams of traffic.~~ • Long and straight alignment. • No overtaking opportunities. • ~~Moderate~~ Low traffic speeds.	Factors that *increase* the likelihood include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years, including: – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Chapel Street intersection. – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and Hotham Street intersection. • Moderate complexity of Inkerman Street and Chapel Street intersection due to presence of trams. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections. • Presence of regular local side streets and crossovers. • ~~Kerbside~~ car parking may limit sight lines at some crossovers for entering traffic, making oncoming traffic difficult to see. Factors that *decrease* the likelihood include: • No Other Injury or Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. • Fully controlled turning movements at the intersection of Inkerman Street and St Kilda Road.	Factors that *increase* the likelihood include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years of these crash types, including: – 3 x Other Injury and 2 x Serious Injury Rear-End type crashes; – 1 x Emerging from Driveway/Lane crash; and – 1 x Other Injury crash involving aggressive criminal behaviour between a cyclist and a motor vehicle. • ~~The median is not wide enough to contain a typical car. Other motorists may attempt to drive around turning traffic where there is not enough width which may cause rear-end and side swipe crashes.~~ • Lack of median hinders passing opportunities for through traffic when a car is propped to turn in the traffic lane which may result in rear-end type crashes. • Presence of regular local side streets and crossovers • ~~Kerbside~~ car parking may limit sight lines at some crossovers for entering traffic, making oncoming traffic difficult to see. • The provision of parallel parking may lead to side swipe crashes with parked cars when drivers attempt to park given the narrow parking space (2.1m), ~~bike lane (1.6m), and narrower traffic lanes (2.8m).~~ Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances.	Factors that *increase* the likelihood include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years, including: – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 2 x Other Injury and 1 x Serious Injury crashes in the past 5 years at the Inkerman Street and Chapel Street intersection. – 1 x Other Injury and 3 x Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Hotham Street intersection. • ~~Signalised crossings are far apart (450m) which are likely to encourage pedestrians to cross midblock.~~ • High volumes of mid-block crossing observed during site inspection. • ~~Kerb outstands in some locations reduce the crossing distance for pedestrians.~~ • ~~The painted median may give some pedestrians a false sense of safety as there are long extents without raised island protection and the median is narrow (approximately 1.6m).~~ • Presence of regular local side streets and crossovers. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street signalised	Factors that *increase* the likelihood include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Bicycle lanes are relatively narrow and may not accommodate non-typical bicycles (child trailers, recumbents etc.) or passing within the bicycle lane, and pedal strikes on the raised kerb are likely. • Bicycle lanes are on-road ~~and traffic-side.~~ • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming bicycle traffic. • ~~The start and termination of bicycle lanes at St Kilda Road (east approach and departure) and Chapel Street forces cyclists to merge with motorists. The likelihood of a crash increases further at Chapel Street during 'no-stopping' times as lane separation line marking is poor on the approaches.~~ • The start and termination of bicycle lanes at Hotham Street forces cyclists to merge with motorists. • ~~1.9m-wide kerbside car parking with no offset to 1.6m bicycle lanes and 2.8m traffic lanes increases the likelihood of car-dooring crashes.~~ • ~~The median is not wide enough to store a propped car. Other motorists may attempt to drive around turning traffic where~~	Factors that *increase* the likelihood include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming motorcycle traffic. Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances • ~~Traffic lane surface is clear of destabilising objects (speed bumps, utility pit lids, surface defects).~~ • Long, straight, and flat corridor provides stable road geometry (for through traffic only).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
			• Dedicated right turn lanes at Chapel Street, Westbury Street, and Hotham Street intersections lowers complexity of intersections. • Signalisation of high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street). • Kerb outstand treatments at minor road intersections will pull the minor road approach vehicle forward, enabling better visibility of all traffic along Inkerman Street. • ~~Moderate~~ Low speeds enable shorter stopping distances.	• Consistency in the number and configuration of traffic lanes at the signalised intersections may reduce the likelihood of late lane changing.	intersection may increase the likelihood of crashes involving pedestrians as turning traffic may fail to appropriately give-way. Factors that *decrease* the likelihood include: • Signalisation of the high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street) including pedestrian crossings. • ~~Provision of median island refuges raise awareness for motorists and cyclists of crossing pedestrians.~~ • Raised platform crossings and surface treatments at minor side streets between St Kilda Road and Chapel Street promote awareness of pedestrians for turning traffic. • Long and straight corridor ~~with median where pedestrians may store~~ may provide adequate sight ~~distances if pedestrians choose appropriate gaps to cross~~ which may grant improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances. • Provision of convenient raised pedestrian crossings throughout the scheme raises awareness of crossing pedestrians and calms traffic. • Parking lane presents as a storage area for pedestrians where there is no parking and reduces the crossing distance. • Attentional linemarking on approach to pedestrian crossings. • Flashing lights on approach to pedestrian crossings.\ • Modified kerb outstands give pedestrians wide storage room for staging crossing across cycling and traffic lane.	~~there is not enough width and may strike a cyclist.~~ • ~~Kerbside car parking increases the likelihood of a crash involving a cyclist as motorists must cross over the bicycle lanes to park.~~ • Turning motor traffic must turn across bicycle lanes. • ~~Kerbside~~ car parking may limit sight lines at some crossovers for entering traffic, making oncoming traffic difficult to see. • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections.~~ Factors that *decrease* the likelihood include: • Bicycle lane surface treatments increase awareness of cyclists at some conflict points. • Cyclist storage boxes at the signalised intersections allow cyclists to be seen, progress through the conflict points faster, and separates cyclists from motorist traffic. • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections may only attract confident riders/may discourage less confident riders from the route.~~ • Long and straight corridor may provide adequate sight distances to cyclists ahead, granting improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances. • Modified kerb outstands at some side roads navigate cyclists behind intersection traffic.	
	1/4	2.5/4	2.5/4	2/4	2.5/4	2/4	2.5/4
Severity	Side impacts with fixed objects at speeds greater than 30km/h are likely to cause death or serious injury. Factors that *increase* the severity include:	Impacts with an oncoming vehicle at speeds greater than 70km/h are likely to cause death or serious injury. Factors that *increase* the severity include:	Side on impacts with a vehicle at speeds greater than 50km/h are likely to cause death or serious injury. Factors that *increase* the severity include:	Factors that *increase* the severity include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years.	Pedestrians struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/pedestrian crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury.	Cyclists struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/cyclist crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury.	Due to the vulnerability of motorcyclists, a crash between a motorcycle and a roadside hazard or parked car is likely to result in serious trauma unless speeds are very low.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	• 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate 50km/h~~ Low 40km/h speed limit. • Many fixed objects on the roadside – poles, trees, and roadside furniture. Factors that *decrease* the severity include: • Some room to recover within ~~bicycle and~~ parking lane.	• None Factors that *decrease* the severity include: • ~~Median treatment grants more time for vehicles to reduce speeds (energy).~~ • ~~Moderate 50km/h~~ Low 40km/h speed limit.	• 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • High impact angles at all intersections. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections exposes vehicles to high impact angles. • Trams on Chapel Street introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • ~~Moderate~~ Low speeds reduce impact energy.	Factors that *decrease* the severity include: • Same direction nature of Other crash types. • ~~Moderate~~ Low speeds reduce impact energy.	Factors that *increase* the severity include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h). • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Lowered 40km/h speed limit. • Modified kerb outstand arrangement with elevated pedestrian paths reduces pedestrian-motor vehicle crash energy.	Factors that *increase* the severity include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h) • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Lowered 40km/h speed limit. • Modified kerb outstand arrangement with elevated cyclist paths reduces cyclist-motor vehicle crash energy.	Factors that *increase* the severity include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • High impact angles between errant motorcyclists and fixed roadside hazards (trees, poles, and structures). • Trams on Chapel Street can introduce more energy into a crash than a typical car. • ~~Moderate 50km/h speed limit.~~ Factors that *decrease* the severity include: • Lowered 40km/h speed limit.
	2/4	1/4	2/4	1.5/4	3/4	3/4	3/4
Product	8/64	8/64	20/64	12/64	30/64	24/64	30/64
Total							134/448

5.4 Project Option 3

Table 7 below shows the SSA scoring matrix for Project Option 3 – kerbside parking on both sides with traffic-side bicycle lanes.

Table 7: Project Option 3 Safe System Assessment matrix.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For head-on crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For intersection crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For 'other' crash types (including rear-end, side swipes, and parking related crashes), AADT is >10,000 vehicles per day (Austroads trigger).	There are significant pedestrian traffic generators at the site. Pedestrian volumes are > 100 units per day (Austroads trigger).	The site is a significant cycling corridor and connects to other major cycling corridors. Cyclist volumes are > 100 units per day (Austroads trigger).	For motorcyclist crash types, volumes are >100 units per day (Austroads trigger).
	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Likelihood	Factors that *increase* the likelihood include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate~~ Low traffic speeds. • ~~Narrow traffic lanes, median trees may push motorists across towards kerbside.~~ • Evasive manoeuvres due to high pedestrian volumes, ~~with pedestrians crossing from between parked cars and across median.~~ Factors that *decrease* the likelihood include: • Single lane in each direction negates possibility of a crash from lane changing and avoids evasive action (run-off-road) from lane changing. • Long and straight alignment. • Bicycle and parking lane gives room to recover. • Low potential for driver fatigue due to regular requirement for driver response (signalised intersections). • Dedicated pedestrian crossing points reduces informal pedestrian crossing.	Factors that *increase* the likelihood include: • ~~Regular sections where the median is painted rather than a physical separator.~~ Factors that *decrease* the likelihood include: • No history of Head-On type crashes in the past 5 years. • ~~Median island (painted and constructed) separates streams of traffic.~~ • Long and straight alignment. • No overtaking opportunities. • ~~Moderate~~ Low traffic speeds.	Factors that *increase* the likelihood include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years, including: – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Chapel Street intersection. – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and Hotham Street intersection. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections. • Moderate complexity of Inkerman Street and Chapel Street intersection due to presence of trams. • High right turn volumes at the Chapel Street and Inkerman Street intersection. • Presence of regular local side streets and crossovers. • Kerbside car parking may limit sight lines at some crossovers making oncoming traffic difficult to see. Factors that *decrease* the likelihood include: • No Other Injury or Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. • Fully controlled turning movements at the intersection	Factors that *increase* the likelihood include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years of these crash types, including: – 3 x Other Injury and 2 x Serious Injury Rear-End type crashes; – 1 x Emerging from Driveway/Lane crash; and – 1 x Other Injury crash involving aggressive criminal behaviour between a cyclist and a motor vehicle. • ~~The median is not wide enough to contain a typical car. Other motorists may attempt to drive around turning traffic where there is not enough width which may cause rear-end and side swipe crashes.~~ • Lack of median hinders passing opportunities for through traffic when a car is propped to turn in the traffic lane which may result in rear-end type crashes. • Presence of regular local side streets and crossovers. • Kerbside car parking may decrease sight lines at some property accesses for emerging traffic, making main road traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane • The provision of parallel parking may lead to side swipe crashes with parked cars when drivers attempt to park given the narrow parking space (2.1m), ~~bike lane (1.6m), and narrower traffic lanes (2.8m).~~ Factors that *decrease* the likelihood include:	Factors that *increase* the likelihood include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years, including: – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 2 x Other Injury and 1 x Serious Injury crashes in the past 5 years at the Inkerman Street and Chapel Street intersection. – 1 x Other Injury and 3 x Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Hotham Street intersection. • ~~Signalised crossings are far apart (450m) which are likely to encourage pedestrians to cross midblock.~~ • High volumes of mid-block crossing observed during site inspection. • Kerb outstands in some locations (at the mid-block pedestrian crossings) reduce the crossing distance for pedestrians. • ~~The painted median may give some pedestrians a false sense of safety as there are long extents without raised island protection and the median is narrow (approximately 1.6m).~~ • Presence of regular local side streets and crossovers.	Factors that *increase* the likelihood include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Bicycle lanes are relatively narrow. • Bicycle lanes are on-road and traffic-side, with narrow painted buffers to the traffic lane and parking lane. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming bicycle traffic. • ~~The start and termination of bicycle lanes at St Kilda Road (east approach and departure) and Chapel Street forces cyclists to merge with motorists. The likelihood of a crash increases further at Chapel Street during 'no-stopping' times as lane separation line marking is poor on the approaches.~~ • The start and termination of bicycle lanes at Hotham Street forces cyclists to merge with motorists. • 2.1m-wide kerbside car parking ~~with no offset~~ to ~~1.6m~~ 1.2m bicycle lanes and ~~2.8m~~ 3m traffic lanes increases the likelihood of car-dooring crashes (only a 0.5m offset to parking lane). • ~~The median is not wide enough to store a propped car. Other motorists may attempt to drive around turning traffic where there is not enough width and may strike a cyclist.~~	Factors that *increase* the likelihood include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming motorcycle traffic. Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances • ~~Traffic lane surface is clear of destabilising objects (speed bumps, utility pit lids, surface defects).~~ • Long, straight, and flat corridor provides stable road geometry (for through traffic only).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
			of Inkerman Street and St Kilda Road. • Dedicated right turn lanes at Chapel Street, Westbury Street, and Hotham Street intersections lowers complexity of intersections. • Signalisation of high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street). • Kerb outstand treatments at minor road intersections will pull the minor road approach vehicle forward, enabling better visibility of all traffic along Inkerman Street. • ~~Moderate~~ Low speeds enable shorter stopping distances.	• ~~Moderate~~ Low speeds enable shorter stopping distances. • Consistency in the number and configuration of traffic lanes at the signalised intersections may reduce the likelihood of late lane changing.	• Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street signalised intersection may increase the likelihood of crashes involving pedestrians as turning traffic may fail to appropriately give-way. Factors that *decrease* the likelihood include: • Signalisation of the high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street) including pedestrian crossings. ~~• Provision of median island refuges raise awareness for motorists and cyclists of crossing pedestrians.~~ • Raised platform crossings and surface treatments at minor side streets between St Kilda Road and Chapel Street promote awareness of pedestrians for turning traffic. • Long and straight corridor ~~with median where pedestrians may store~~ may provide adequate sight ~~distances if pedestrians choose appropriate gaps to cross~~ which may grant improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances. • Attentional linemarking on approach to pedestrian crossings. • Flashing lights on approach to pedestrian crossings. • Kerb outstands give pedestrians wide storage room for staging crossing across traffic lane.	• Kerbside car parking increases the likelihood of a crash involving a cyclist as motorists must cross over the bicycle lanes to park. • Turning motor traffic must turn across bicycle lanes. • Kerbside car parking may decrease sight lines at some property accesses and side streets for entering traffic, making oncoming traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane. • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections.~~ Factors that *decrease* the likelihood include: • Bicycle lane surface treatments increase awareness of cyclists at some conflict points. • Cyclist storage boxes at the signalised intersections allow cyclists to be seen, progress through the conflict points faster, and separates cyclists from motorist traffic. ~~• Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections may only attract confident riders/may discourage less confident riders from the route.~~ • Long and straight corridor may provide adequate sight distances to cyclists ahead, granting improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances.	
	0.5/4	1.5/4	2.5/4	1.5/4	2/4	3.5/4	2.5/4
Severity	Side impacts with fixed objects at speeds greater than 30km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate 50km/h~~ Low 40km/h speed limit.	Impacts with an oncoming vehicle at speeds greater than 70km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • None Factors that *decrease* the severity include:	Side on impacts with a vehicle at speeds greater than 50km/h are likely to cause death or serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • High impact angles at all intersections.	Factors that *increase* the severity include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years. Factors that *decrease* the severity include: • Same direction nature of Other crash types. • ~~Moderate~~ Low speeds reduce impact energy.	Pedestrians struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/pedestrian crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years.	Cyclists struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or killed. Also, vehicle/cyclist crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years.	Due to the vulnerability of motorcyclists, a crash between a motorcycle and a roadside hazard or parked car is likely to result in serious trauma unless speeds are very low. Factors that *increase* the severity include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	• Many fixed objects on the roadside – poles, trees, and roadside furniture. Factors that *decrease* the severity include: • Some room to recover within bicycle and parking lane.	• ~~Median treatment grants more time for vehicles to reduce speeds (energy).~~ • ~~50km/h~~ 40km/h speed limit.	• Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections exposes vehicles to high impact angles. • Trams on Chapel Street introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • ~~Moderate~~ Low speeds reduce impact energy.		• Speed environment is above Safe System tolerance (30km/h). • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Reduced 40km/h speed limit.	• Speed environment is above Safe System tolerance (30km/h) • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Reduced 40km/h speed limit.	• High impact angles between errant motorcyclists and fixed roadside hazards (trees, poles, and structures). • Trams on Chapel Street can introduce more energy into a crash than a typical car. • ~~Moderate 50km/h speed limit.~~ Factors that *decrease* the severity include: • Reduced 40km/h speed limit.
	2/4	1/4	2/4	1.5/4	3/4	3/4	3/4
Product	4/64	6/64	20/64	9/64	24/64	42/64	30/64
Total							135/448

5.5 Project Option 3A

Table 8 below shows the SSA scoring matrix for Project Option 3A – kerbside parking on both sides with traffic-side bicycle lanes (as per Option 3, but with reduced parking impacts).

Table 8: Project Option 3A Safe System Assessment matrix.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For head-on crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For intersection crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For 'other' crash types (including rear-end, side swipes, and parking related crashes), AADT is >10,000 vehicles per day (Austroads trigger).	There are significant pedestrian traffic generators at the site. Pedestrian volumes are > 100 units per day (Austroads trigger).	The site is a significant cycling corridor and connects to other major cycling corridors. Cyclist volumes are > 100 units per day (Austroads trigger).	For motorcyclist crash types, volumes are >100 units per day (Austroads trigger).
	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Likelihood	Factors that *increase* the likelihood include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate~~ Low traffic speeds. • ~~Narrow traffic lanes, median trees may push motorists across towards kerbside.~~ • Evasive manoeuvres due to high pedestrian volumes, ~~with pedestrians crossing from between parked cars and across median.~~ Factors that *decrease* the likelihood include: • Single lane in each direction negates possibility of a crash from lane changing and avoids evasive action (run-off-road) from lane changing. • Long and straight alignment. • Bicycle and parking lane gives room to recover. • Low potential for driver fatigue due to regular requirement for driver response (signalised intersections). • Dedicated pedestrian crossing points reduces informal pedestrian crossing.	Factors that *increase* the likelihood include: • ~~Regular sections where the median is painted rather than a physical separator.~~ Factors that *decrease* the likelihood include: • No history of Head-On type crashes in the past 5 years. • ~~Median island (painted and constructed) separates streams of traffic.~~ • Long and straight alignment. • No overtaking opportunities. • ~~Moderate~~ Low traffic speeds.	Factors that *increase* the likelihood include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years, including: – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Chapel Street intersection. – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and Hotham Street intersection. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections. • Moderate complexity of Inkerman Street and Chapel Street intersection due to presence of trams. • High right turn volumes at the Chapel Street and Inkerman Street intersection. • Presence of regular local side streets and crossovers. • Kerbside car parking may limit sight lines at some crossovers making oncoming traffic difficult to see. Factors that *decrease* the likelihood include: • No Other Injury or Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. • Fully controlled turning movements at the intersection	Factors that *increase* the likelihood include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years of these crash types, including: – 3 x Other Injury and 2 x Serious Injury Rear-End type crashes; – 1 x Emerging from Driveway/Lane crash; and – 1 x Other Injury crash involving aggressive criminal behaviour between a cyclist and a motor vehicle. • ~~The median is not wide enough to contain a typical car. Other motorists may attempt to drive around turning traffic where there is not enough width which may cause rear-end and side swipe crashes.~~ • Lack of median hinders passing opportunities for through traffic when a car is propped to turn in the traffic lane which may result in rear-end type crashes. • Presence of regular local side streets and crossovers. • Kerbside car parking may decrease sight lines at some property accesses for emerging traffic, making main road traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane. *More parking retained in Option 3A than Option 3.* • The provision of parallel parking may lead to side swipe crashes with parked cars when drivers attempt to park given the narrow parking space (2.1m), ~~bike lane (1.6m), and narrower traffic lanes (2.8m).~~	Factors that *increase* the likelihood include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years, including: – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 2 x Other Injury and 1 x Serious Injury crashes in the past 5 years at the Inkerman Street and Chapel Street intersection. – 1 x Other Injury and 3 x Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Hotham Street intersection. • ~~Signalised crossings are far apart (450m) which are likely to encourage pedestrians to cross midblock.~~ • High volumes of mid-block crossing observed during site inspection. • Kerb outstands in some locations (at the mid-block pedestrian crossings) reduce the crossing distance for pedestrians. • ~~The painted median may give some pedestrians a false sense of safety as there are long extents without raised island protection and the median is narrow (approximately 1.6m).~~ • Presence of regular local side streets and crossovers.	Factors that *increase* the likelihood include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Bicycle lanes are relatively narrow. • Bicycle lanes are on-road and traffic-side, with narrow painted buffers to the traffic lane and parking lane. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming bicycle traffic. • ~~The start and termination of bicycle lanes at St Kilda Road (east approach and departure) and Chapel Street forces cyclists to merge with motorists. The likelihood of a crash increases further at Chapel Street during 'no-stopping' times as lane separation line marking is poor on the approaches.~~ • The start and termination of bicycle lanes at Hotham Street forces cyclists to merge with motorists. • 2.1m-wide kerbside car parking ~~with no offset~~ to ~~1.6m~~ 1.2m bicycle lanes and ~~2.8m~~ 3m traffic lanes increases the likelihood of car-dooring crashes (only a 0.5m offset to parking lane). • ~~The median is not wide enough to store a propped car. Other motorists may attempt to drive around turning traffic where there is not enough width and may strike a cyclist.~~	Factors that *increase* the likelihood include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming motorcycle traffic. Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances • ~~Traffic lane surface is clear of destabilising objects (speed bumps, utility pit lids, surface defects).~~ • Long, straight, and flat corridor provides stable road geometry (for through traffic only).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
			of Inkerman Street and St Kilda Road. • Dedicated right turn lanes at Chapel Street, Westbury Street, and Hotham Street intersections lowers complexity of intersections. • Signalisation of high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street). • Kerb outstand treatments at minor road intersections will pull the minor road approach vehicle forward, enabling better visibility of all traffic along Inkerman Street. • ~~Moderate~~ Low speeds enable shorter stopping distances.	Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances. • Consistency in the number and configuration of traffic lanes at the signalised intersections may reduce the likelihood of late lane changing.	• Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street signalised intersection may increase the likelihood of crashes involving pedestrians as turning traffic may fail to appropriately give-way. Factors that *decrease* the likelihood include: • Signalisation of the high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street) including pedestrian crossings. • ~~Provision of median island refuges raise awareness for motorists and cyclists of crossing pedestrians.~~ • Raised platform crossings and surface treatments at minor side streets between St Kilda Road and Chapel Street promote awareness of pedestrians for turning traffic. • Long and straight corridor ~~with median where pedestrians may store~~ may provide adequate sight ~~distances if pedestrians choose appropriate gaps to cross~~ which may grant improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances. • Attentional linemarking on approach to pedestrian crossings. • Flashing lights on approach to pedestrian crossings. • Kerb outstands give pedestrians wide storage room for staging crossing across traffic lane. • Nelson Street / Raglan Street: constructed kerb outstands and green pavement highlighting the bicycle lane, plus raised threshold treatments on minor road approaches will reduce traffic speeds on the approaches to these intersections and raise awareness of pedestrians and cyclists.	• Kerbside car parking increases the likelihood of a crash involving a cyclist as motorists must cross over the bicycle lanes to park. *(More parking present in Option 3A than in Option 3)* • Turning motor traffic must turn across bicycle lanes. • Kerbside car parking may decrease sight lines at some property accesses and side streets for entering traffic, making oncoming traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane. *(More parking present in Option 3A than in Option 3)* • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections.~~ Factors that *decrease* the likelihood include: • Bicycle lane surface treatments increase awareness of cyclists at some conflict points. *This is increased in Option 3A at St Kilda Road and Chapel Street when compared to Option 3.* • Cyclist storage boxes at the signalised intersections allow cyclists to be seen, progress through the conflict points faster, and separates cyclists from motorist traffic. • ~~Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections may only attract confident riders/may discourage less confident riders from the route.~~ • Long and straight corridor may provide adequate sight distances to cyclists ahead, granting improved response time. • ~~Moderate~~ Low speeds enable shorter stopping distances.	
	0.5/4	1.5/4	2.5/4	1.75/4	2/4	3.75/4	2.5/4
Severity	Side impacts with fixed objects at speeds greater than 30km/h are	Impacts with an oncoming vehicle at speeds greater than 70km/h are	Side on impacts with a vehicle at speeds greater than 50km/h are	Factors that *increase* the severity include:	Pedestrians struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or	Cyclists struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or	Due to the vulnerability of motorcyclists, a crash between a motorcycle and a roadside hazard

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	likely to cause death or serious injury. Factors that *increase* the severity include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate 50km/h~~ Low 40km/h speed limit. • Many fixed objects on the roadside – poles, trees, and roadside furniture. Factors that *decrease* the severity include: • Some room to recover within bicycle and parking lane.	likely to cause death or serious injury. Factors that *increase* the severity include: • None Factors that *decrease* the severity include: • ~~Median treatment grants more time for vehicles to reduce speeds (energy).~~ • ~~50km/h~~ 40km/h speed limit.	likely to cause death or serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • High impact angles at all intersections. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections exposes vehicles to high impact angles. • Trams on Chapel Street introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • ~~Moderate~~ Low speeds reduce impact energy.	• 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years. Factors that *decrease* the severity include: • Same direction nature of Other crash types. • ~~Moderate~~ Low speeds reduce impact energy.	killed. Also, vehicle/pedestrian crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h). • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Reduced 40km/h speed limit.	killed. Also, vehicle/cyclist crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h) • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Reduced 40km/h speed limit.	or parked car is likely to result in serious trauma unless speeds are very low. Factors that *increase* the severity include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • High impact angles between errant motorcyclists and fixed roadside hazards (trees, poles, and structures). • Trams on Chapel Street can introduce more energy into a crash than a typical car. • ~~Moderate 50km/h speed limit.~~ Factors that *decrease* the severity include: • Reduced 40km/h speed limit.
	2/4	1/4	2/4	1.5/4	3/4	3/4	3/4
Product	4/64	6/64	20/64	10.5/64	24/64	45/64	30/64
Total							139.5/448

5.6 Project Option 4

Table 8 below shows the SSA scoring matrix for Project Option 4 – Minor traffic calming and safety improvements with reduced 40km/h speed limit, kerb outstands at side streets and raised pavement treatments.

Table 9: Project Option 4 Safe System Assessment matrix.

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For head-on crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For intersection crash types, AADT is >10,000 vehicles per day (Austroads Trigger).	For 'other' crash types (including rear-end, side swipes, and parking related crashes), AADT is >10,000 vehicles per day (Austroads trigger).	There are significant pedestrian traffic generators at the site. Pedestrian volumes are > 100 units per day (Austroads trigger).	The site is a significant cycling corridor and connects to other major cycling corridors. Cyclist volumes are > 100 units per day (Austroads trigger).	For motorcyclist crash types, volumes are >100 units per day (Austroads trigger).
	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Likelihood	Factors that *increase* the likelihood include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • ~~Moderate~~ Low traffic speeds. • Narrow traffic lanes, median trees may push motorists across towards kerbside. • Evasive manoeuvres due to high pedestrian volumes, with pedestrians crossing from between parked cars and across median. Factors that *decrease* the likelihood include: • Single lane in each direction negates possibility of a crash from lane changing and avoids evasive action (run-off-road) from lane changing. • Long and straight alignment. • Bicycle and parking lane gives room to recover. • Low potential for driver fatigue due to regular requirement for driver response (signalised intersections). • Low traffic speeds encouraged by the presence of 3 x raised pavement treatments.	Factors that *increase* the likelihood include: • Regular sections where the median is painted rather than a physical separator. Factors that *decrease* the likelihood include: • No history of Head-On type crashes in the past 5 years. • Median island (painted and constructed) separates streams of traffic. • Long and straight alignment. • No overtaking opportunities. • ~~Moderate~~ Low traffic speeds.	Factors that *increase* the likelihood include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years, including: – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Chapel Street intersection. – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and Hotham Street intersection. • Moderate complexity of Inkerman Street and Chapel Street intersection due to presence of trams. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections. • Presence of regular local side streets and crossovers. • Kerbside car parking may limit sight lines at some crossovers making oncoming traffic difficult to see. Factors that *decrease* the likelihood include: • No Other Injury or Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. • Fully controlled turning movements at the signalised intersection of Inkerman Street and St Kilda Road.	Factors that *increase* the likelihood include: • 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years of these crash types, including: – 3 x Other Injury and 2 x Serious Injury Rear-End type crashes; – 1 x Emerging from Driveway/Lane crash; and – 1 x Other Injury crash involving aggressive criminal behaviour between a cyclist and a motor vehicle. • The median is not wide enough to contain a typical car. Other motorists may attempt to drive around turning traffic where there is not enough width which may cause rear-end and side swipe crashes. • Presence of regular local side streets and crossovers. • Kerbside car parking may decrease sight lines at some property accesses for emerging traffic, making main road traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane • The provision of parallel parking may lead to side swipe crashes with parked cars when drivers attempt to park given the narrow parking space (2m), bike lane (1.6m), and narrower traffic lanes (2.8m). Factors that *decrease* the likelihood include: • ~~Moderate~~ Low speeds enable shorter stopping distances. • Low traffic speeds encouraged by the presence of 3 x raised pavement treatments.	Factors that *increase* the likelihood include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years, including: – 2 x Other Injury crashes in the past 5 years at the Inkerman Street and St Kilda Road intersection. – 2 x Other Injury and 1 x Serious Injury crashes in the past 5 years at the Inkerman Street and Chapel Street intersection. – 1 x Other Injury and 3 x Serious Injury crashes in the past 5 years at the Inkerman Street and Westbury Street intersection. – 1 x Other Injury and 1 x Serious Injury crash in the past 5 years at the Inkerman Street and Hotham Street intersection. • Signalised crossings are far apart (450m) which are likely to encourage pedestrians to cross midblock. • High volumes of mid-block crossing observed during site inspection. • Kerb outstands in some locations reduce the crossing distance for pedestrians. • The painted median may give some pedestrians a false sense of safety as there are long extents without raised island protection and the median is narrow (approximately 1.6m). • Presence of regular local side streets and crossovers. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street signalised	Factors that *increase* the likelihood include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Bicycle lanes are on-road and traffic-side. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming bicycle traffic. • The start and termination of bicycle lanes at St Kilda Road (east approach and departure) and Chapel Street forces cyclists to merge with motorists. The likelihood of a crash increases further at Chapel Street during 'no-stopping' times as lane separation line marking is poor on the approaches. • The start and termination of bicycle lanes at Hotham Street forces cyclists to merge with motorists. • 1.9m-wide kerbside car parking with no offset to 1.6m bicycle lanes and 2.8m traffic lanes increases the likelihood of car-dooring crashes. • The median is not wide enough to store a propped car. Other motorists may attempt to drive around turning traffic where there is not enough width and may strike a cyclist. • Kerbside car parking increases the likelihood of a crash involving a cyclist as motorists must cross over the bicycle lanes to park.	Factors that *increase* the likelihood include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • At signalised intersections, motorists performing filtered right turns (Chapel Street, Westbury Street, and Hotham Street) may fail to see, judge the speed of, and give way to oncoming motorcycle traffic. Factors that *decrease* the likelihood include: • ~~Moderate~~ low speeds enable shorter stopping distances. • Traffic lane surface is clear of destabilising objects (speed bumps, utility pit lids, surface defects). • Long, straight, and flat corridor provides stable road geometry (for through traffic only).

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
			• Dedicated right turn lanes at Chapel Street, Westbury Street, and Hotham Street intersections lowers complexity of intersections. • Signalisation of high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street). • ~~Moderate~~ low speeds enable shorter stopping distances. • Kerb outstand treatments at minor road intersections will pull the minor road approach vehicle forward, enabling better visibility of all traffic along Inkerman Street.		intersection may increase the likelihood of crashes involving pedestrians as turning traffic may fail to appropriately give-way. Factors that *decrease* the likelihood include: • Signalisation of the high-volume intersections (St Kilda Road, Chapel Street, and Hotham Street) including pedestrian crossings. • Provision of median island refuges raise awareness for motorists and cyclists of crossing pedestrians. • Raised platform crossings and surface treatments at minor side streets between St Kilda Road and Chapel Street promote awareness of pedestrians for turning traffic. • Long and straight corridor with median where pedestrians may store may provide adequate sight distances if pedestrians choose appropriate gaps to cross which may grant improved response time. • ~~Moderate~~ low speeds enable shorter stopping distances. • Nelson Street / Raglan Street: constructed kerb outstands and green pavement highlighting the bicycle lane, plus raised threshold treatments on minor road approaches will reduce traffic speeds on the approaches to these intersections and raise awareness of pedestrians and cyclists. • Low traffic speeds encouraged by the presence of 3 x raised pavement treatments.	• Turning motor traffic must turn across bicycle lanes. • Kerbside car parking may decrease sight lines at some property accesses and side streets for entering traffic, making oncoming traffic difficult to see without pulling out slightly into the bicycle lane or traffic lane. • Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections. Factors that *decrease* the likelihood include: • Bicycle lane surface treatments increase awareness of cyclists at some conflict points. • Cyclist storage boxes at the signalised intersections allow cyclists to be seen, progress through the conflict points faster, and separates cyclists from motorist traffic. • Requirement for cyclists to merge with the traffic lane at the approaches to signalised intersections may only attract confident riders/may discourage less confident riders from the route. • Long and straight corridor may provide adequate sight distances to cyclists ahead, granting improved response time. • ~~Moderate~~ low speeds enable shorter stopping distances. • Nelson Street / Raglan Street: constructed kerb outstands and green pavement highlighting the bicycle lane, plus raised threshold treatments on minor road approaches will reduce traffic speeds on the approaches to these intersections and raise awareness of pedestrians and cyclists. • Low traffic speeds encouraged by the presence of 3 x raised pavement treatments.	
	0.75/4	0.75/4	2.5/4	2/4	2.5/4	3/4	2.25/4
Severity	Side impacts with fixed objects at speeds greater than 30km/h are	Impacts with an oncoming vehicle at speeds greater than 70km/h are	Side on impacts with a vehicle at speeds greater than 50km/h are	Factors that *increase* the severity include:	Pedestrians struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or	Cyclists struck at speeds above 30km/h (the Safe System tolerance) are likely to be seriously injured or	Due to the vulnerability of motorcyclists, a crash between a motorcycle and a roadside hazard

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
	likely to cause death or serious injury. Factors that *increase* the severity include: • 1 x Serious and 2 x Other Injury crashes in the past 5 years. • Moderate 50km/h speed limit. • Many fixed objects on the roadside – poles, trees, and roadside furniture. Factors that *decrease* the severity include: • Some room to recover within bicycle and parking lane.	likely to cause death or serious injury. Factors that *increase* the severity include: • None Factors that *decrease* the severity include: • Median treatment grants more time for vehicles to reduce speeds (energy). • Moderate 50km/h speed limit.	likely to cause death or serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • High impact angles at all intersections. • Filtered right turns at the Chapel Street, Westbury Street, and Hotham Street intersections exposes vehicles to high impact angles. • Trams on Chapel Street introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • Moderate speeds reduce impact energy.	• 5 x Other Injury and 2 x Serious Injury crashes in the past 5 years. Factors that *decrease* the severity include: • Same direction nature of Other crash types. • Moderate speeds reduce impact energy.	killed. Also, vehicle/pedestrian crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 6 x Other Injury and 7 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h). • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • None.	killed. Also, vehicle/cyclist crashes at even lower speeds (especially involving heavy vehicles) can cause serious injury. Factors that *increase* the severity include: • 8 x Other Injury and 2 x Serious Injury crashes in the past 5 years. • Speed environment is above Safe System tolerance (30km/h). • Trams on Chapel Street can introduce more energy into a crash than a typical car. Factors that *decrease* the severity include: • None	or parked car is likely to result in serious trauma unless speeds are very low. Factors that *increase* the severity include: • 1 x Serious Injury and 1 x Other Injury crash recorded in the past 5 years. • High impact angles between errant motorcyclists and fixed roadside hazards (trees, poles, and structures). • Trams on Chapel Street can introduce more energy into a crash than a typical car. • Moderate 50km/h speed limit. Factors that *decrease* the severity include: • None.
	2.5/4	1/4	2.5/4	2/4	4/4	4/4	4/4
Product	7.5/64	3/64	25/64	16/64	40/64	48/64	36/64
Total							175.5/448

6. Safe System Scoring Summary

This section summarises the results from the Safe System Matrix Scoring above. The overall SSA Scores are shown in Table 10 and

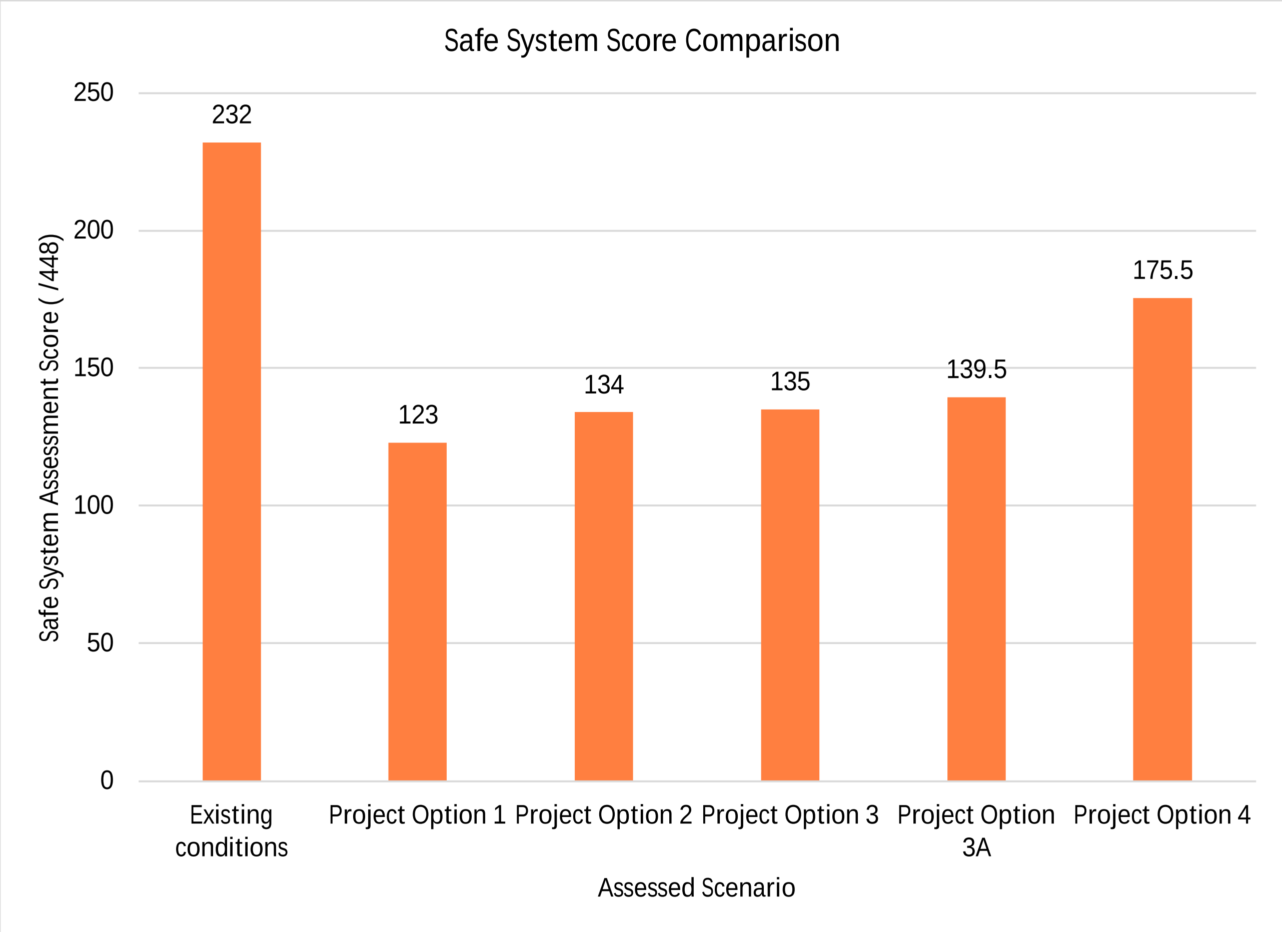


Figure 10, which are the sum of the project scores for each table as assessed in the matrices.

Table 10: Safe System scoring summary.

Project Section	Safe System Score (/448)
Existing Conditions	232
Project Option 1 – Kerbside bicycle lanes with parking on one side	123
Project Option 2 – Kerbside bicycle lanes with parking on both sides	134
Project Option 3 – Kerbside parking on both sides with traffic-side bicycle lanes	135
Project Option 3A – Kerbside parking on both sides with traffic-side bicycle lanes (as per Option 3, but with reduced parking impacts)	139.5
Project Option 4 – Minor traffic calming and safety improvements	175.5

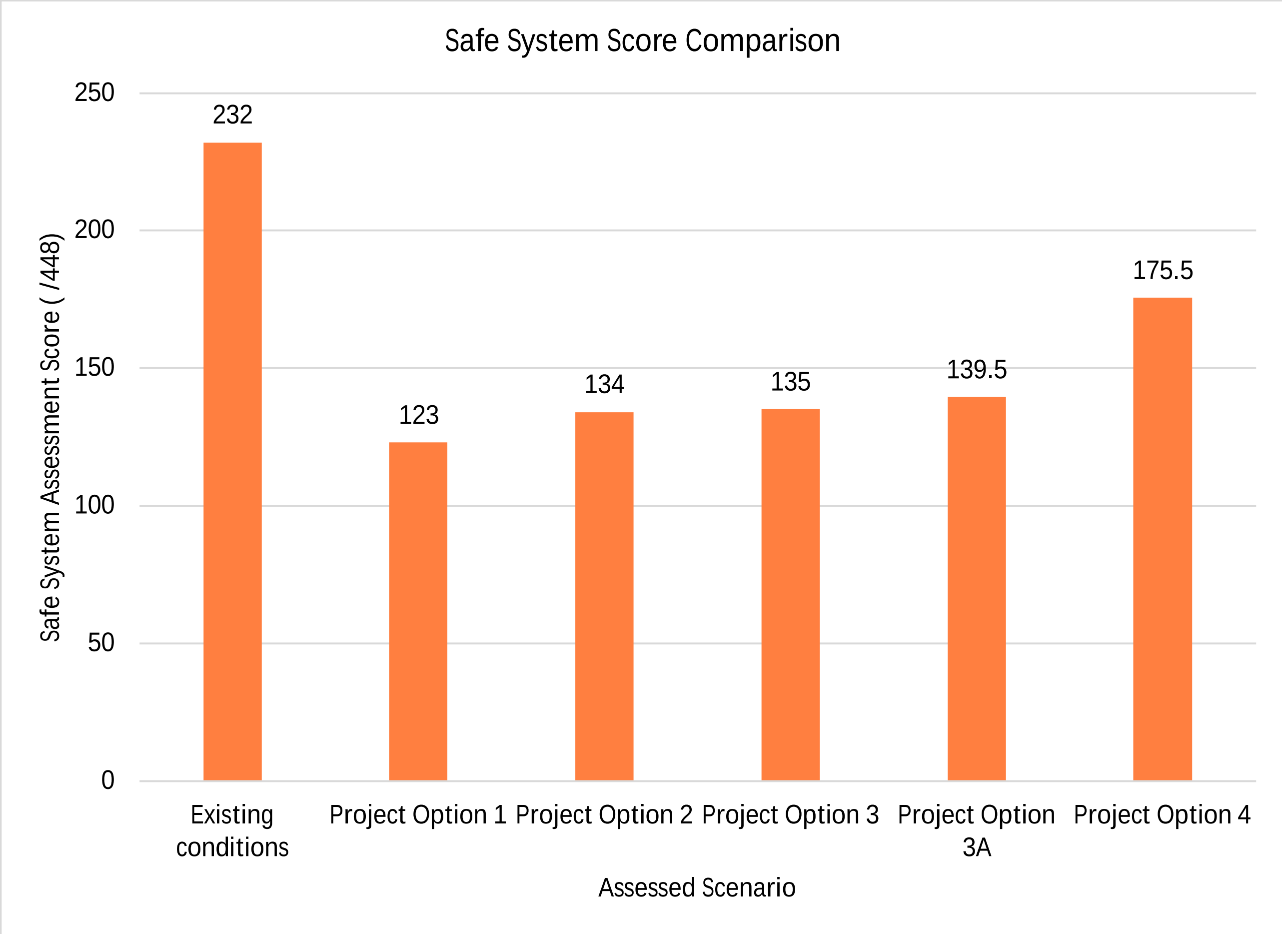


Figure 10: Safe System score comparison.

Grouped by travel mode, the safe system scores are shown in Figure 11. This shows how the project options change Safe System outcomes for the different road users for the corridor. To achieve the grouped score for Motor Vehicle, crash types have been aggregated and factored accordingly to provide a score out of 64.

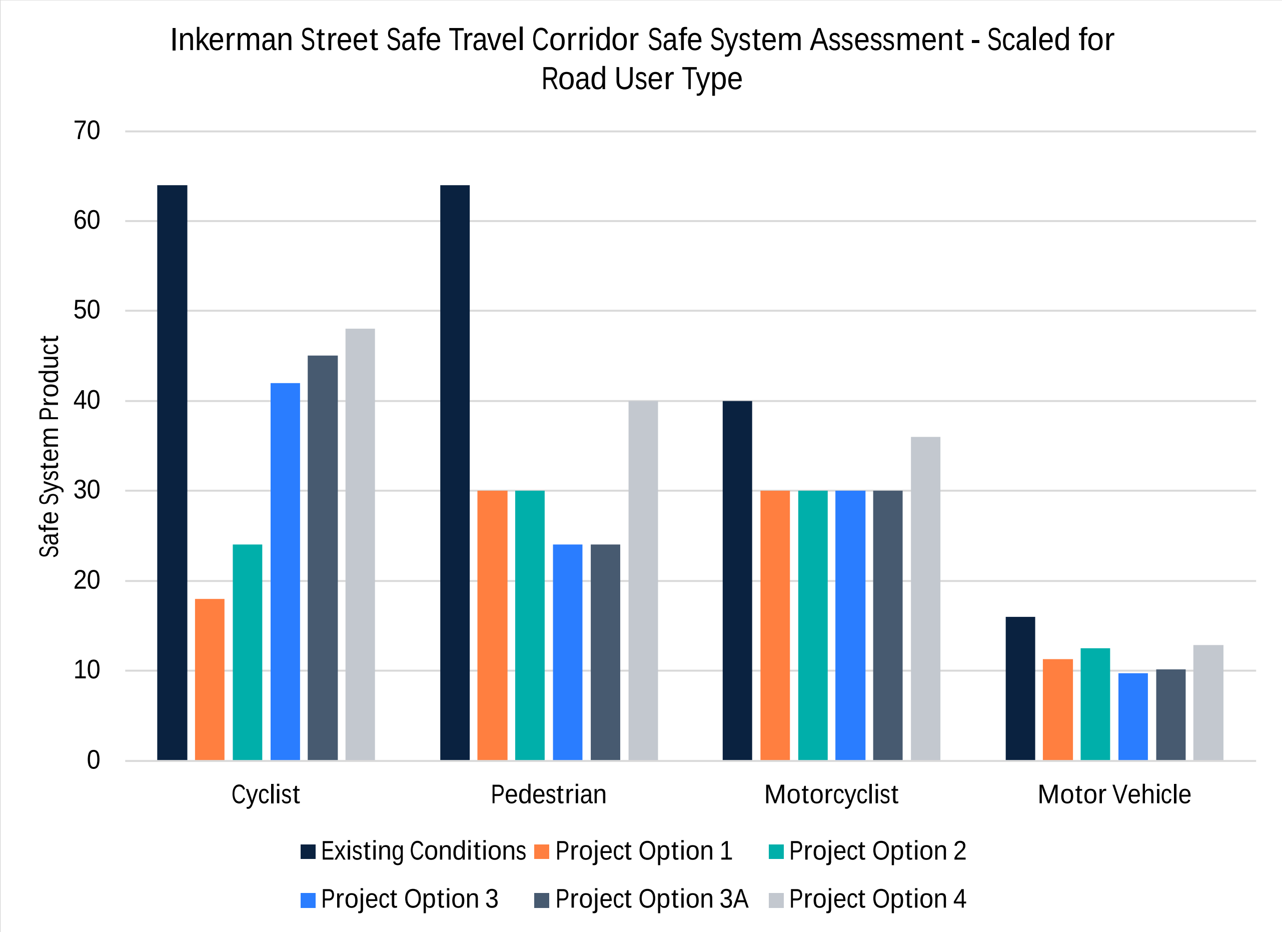


Figure 11: Safe System product score by road user crash type.

The assessment shows that pedestrian and cyclist crash types are the most benefited by the project options, with some improvements also to be delivered for motorcycles and motor vehicles. This significant improvement for vulnerable road users (pedestrians and cyclists) under the project options shows a favourable outcome as vulnerable road users do not have mechanical systems to protect them in a crash as motor vehicles do. They must be protected in the road system.

The scores indicate that Project Option 1 (kerbside bicycle lanes with parking on one side only) presents the best overall improvement in alignment with Safe System principles for Inkerman Street, followed by Project Option 2 and then Project Option 3. Option 1 and 2 present comparable improvements for pedestrian safety. All options present an improvement for motorcyclist and motor vehicle safety.

Project Option 1 provides the best overall improvement in Safe System alignment for cyclists due to several reasons. These include the wide protected kerbside bicycle lanes, reduced speed limit for motorists, and the improved set-back alignment of the bicycle lanes past local side streets, allowing for vehicles entering and exiting the side streets to prop clear of the bicycle lane and give way to cyclists separate to the motorist's turning movements at the intersection.

Project Option 4 presents the least overall improvement in Safe System alignment for cyclists and pedestrians, which is a key contributor in it achieving the worst product score of the 5 project options reviewed. For vulnerable user groups, contributing factors to the lower safety outcome include the lack of a physical buffer between the traffic lane and the bicycle lanes, and the need for vehicles performing parking manoeuvres to do so across the bicycle lanes.

6.1 Project Option 1 – Kerbside bicycle lanes with parking on one side

Safe System product scores for Project Option 1 are shown in Figure 12. Cyclist and Pedestrian crashes see the greatest reduction in product score. This is primarily due to:

- A wide, separated, continuous, kerbside bicycle lane;
- Navigation of the cycling lane behind the stored vehicle on side roads.
- Raised pedestrian mid-block crossings with flashing lights and attentional linemarking; and
- A speed limit reduction to 40km/h.

The reduced speed limit also effects the likelihood and severity of all other crash types, reducing their Safe System product score and improving safety outcomes for Inkerman Street. Other crashes also reduce due to the increased parking lane and traffic lane widths, and the painted separation.

Head-On scores increase due to the removal of the median island, however, the reduced speed limit counters the likelihood and severity effects of this change.

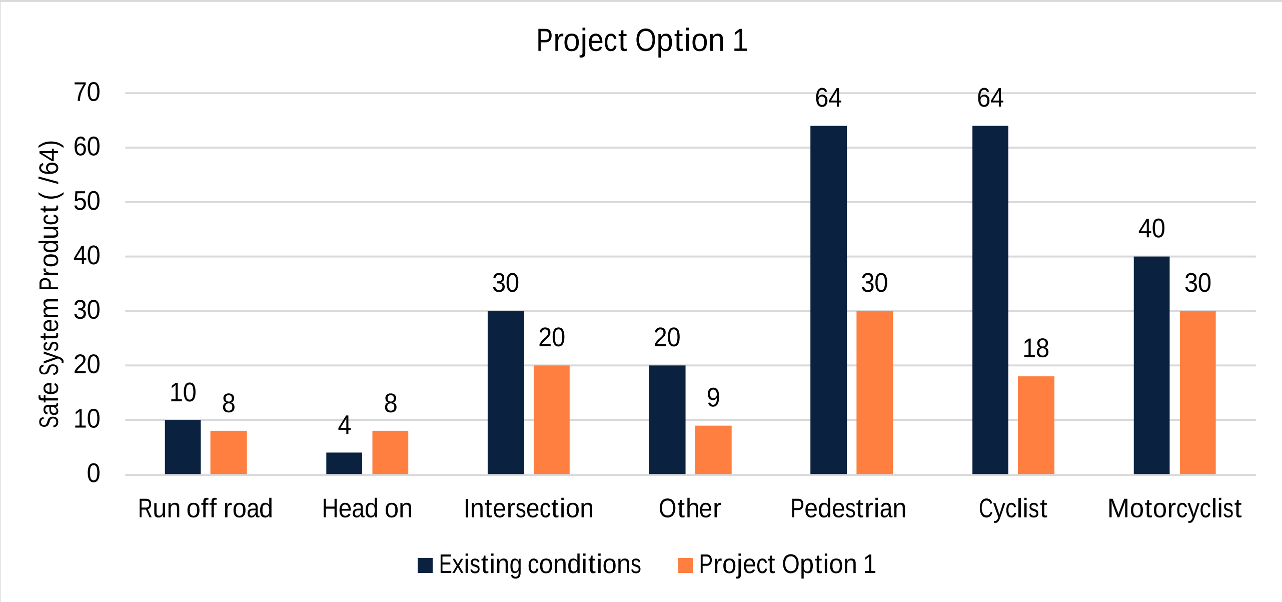


Figure 12: Project Option 1 Safe System product scores.

6.2 Project Option 2 – Kerbside bicycle lanes with parking on both sides

The Safe System product scores for Project Option 2 are shown in Figure 13. Cyclist and Pedestrian crashes see the greatest reduction in product score. This is primarily due to:

- A separated, continuous, kerbside bicycle lane;
- Raised pedestrian mid-block crossings with flashing lights and attentional linemarking; and
- A speed limit reduction to 40km/h.

The reduced speed limit also effects the likelihood and severity of all other crash types, reducing their Safe System product score.

Head-On scores increase due to the removal of the median island, however, the reduced speed limit counters the likelihood and severity effects of this change.

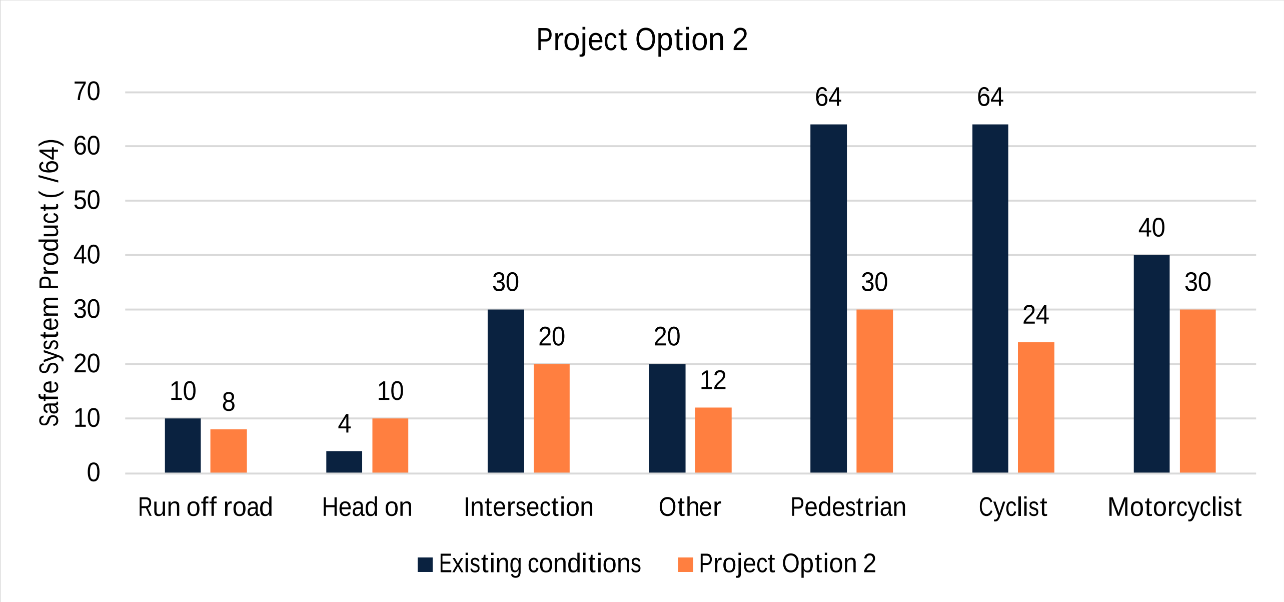


Figure 13: Project Option 2 Safe System product scores.

6.3 Project Option 3 – Kerbside parking on both sides with traffic-side bicycle lanes

The Safe System product scores for Project Option 3 are shown in Figure 14. Cyclist and Pedestrian crashes see the greatest reduction in product score. This is primarily due to:

- A continuous bicycle lane;
- Raised pedestrian mid-block crossings with flashing lights and attentional linemarking; and
- A speed limit reduction to 40km/h.

It is noted that Project Option 3 presents a lower overall improvement in Safe System alignment for cyclists when compared to Option 1 and 2. For cyclists, contributing factors to the lower safety outcome include the lack of a physical buffer between the traffic lane and the bicycle lanes, and the need for vehicles performing parking manoeuvres to do so across the bicycle lanes.

The reduced speed limit also effects the likelihood and severity of all other crash types, reducing their Safe System product score. Other crashes also reduce when compared to existing conditions due to the increased parking lane and traffic lane width, and the bicycle lane and painted buffers.

Head-On scores increase due to removal of the median island, however, the reduced speed limit counters the likelihood and severity effects of this change.

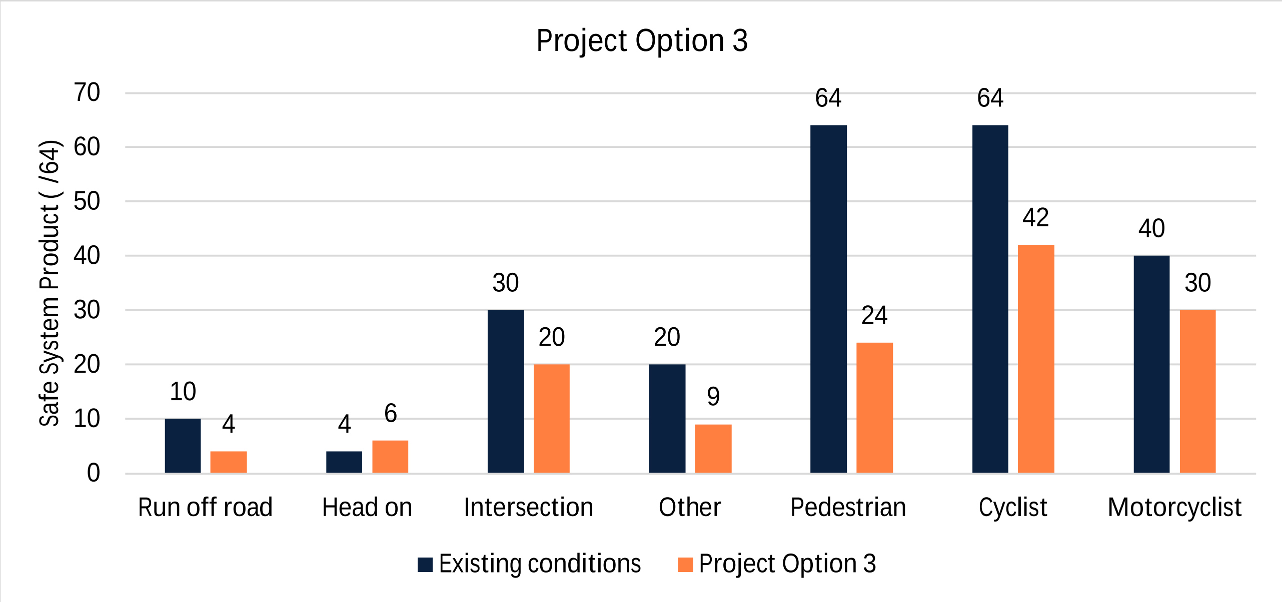


Figure 14: Project Option 3 Safe System product scores.

6.4 Project Option 3A – Kerbside parking on both sides with traffic-side bicycle lanes (as per Option 3, but with reduced parking impacts)

The Safe System product scores for Project Option 3A are shown in Figure 15. Cyclist and Pedestrian crashes see the greatest reduction in product score. This is primarily due to:

- A continuous bicycle lane;
- Raised pedestrian mid-block crossings with flashing lights and attentional linemarking; and
- A speed limit reduction to 40km/h.

It is noted that Project Option 3A presents a lower overall improvement in Safe System alignment for cyclists when compared to Option 1, 2 and 3. For cyclists, contributing factors to the lower safety outcome include the lack of a physical buffer between the traffic lane and the bicycle lanes, and the need for vehicles performing parking manoeuvres to do so across the bicycle lanes. Option 3A scores worse than Option 3 due to additional parking being retained, including near intersections where there are more interactions and risks to navigate.

The reduced speed limit also effects the likelihood and severity of all other crash types, reducing their Safe System product score. Other crashes also reduce when compared to existing conditions due to the increased parking lane and traffic lane width, and the bicycle lane and painted buffers.

Head-On scores increase due to removal of the median island; however, the reduced speed limit counters the likelihood and severity effects of this change.

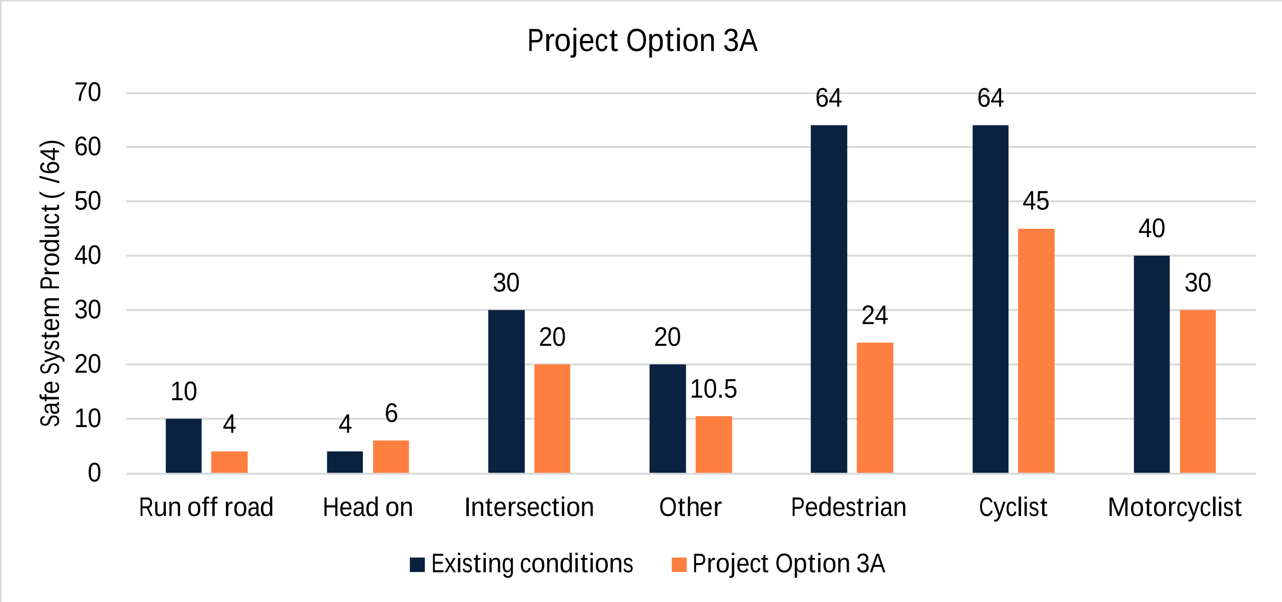


Figure 15: Project Option 3A Safe System product scores.

6.5 Project Option 4 – Minor traffic calming and safety improvements

The Safe System product scores for Project Option 4 are shown in Figure 16. Cyclist and Pedestrian crashes see the greatest reduction in product score. This is primarily due to:

- A speed limit reduction to 40km/h;
- A continuous bicycle lane;
- Kerb outstand treatments at minor road intersections will pull the minor road approach vehicle forward, enabling better visibility of traffic/cyclists/pedestrians along Inkerman Street;
- Nelson Street / Raglan Street: constructed kerb outstands and green pavement highlighting the bicycle lane, plus raised threshold treatments on minor road approaches will reduce traffic speeds on the approaches to these intersections and raise awareness of pedestrians and cyclists; and
- Raised pavement treatments at 3 x locations to support the reduced speed limit.

It is noted that Project Option 4 presents the least overall improvement in Safe System alignment for cyclists, which is a key contributor in it achieving the worst product score of the 5 project options reviewed. For cyclists, contributing factors to the lower safety outcome include the lack of a physical buffer between the traffic lane and the bicycle lanes, and the need for vehicles performing parking manoeuvres to do so across the bicycle lanes.

The reduced speed limit also effects the likelihood and severity of all other crash types, reducing their Safe System product score.

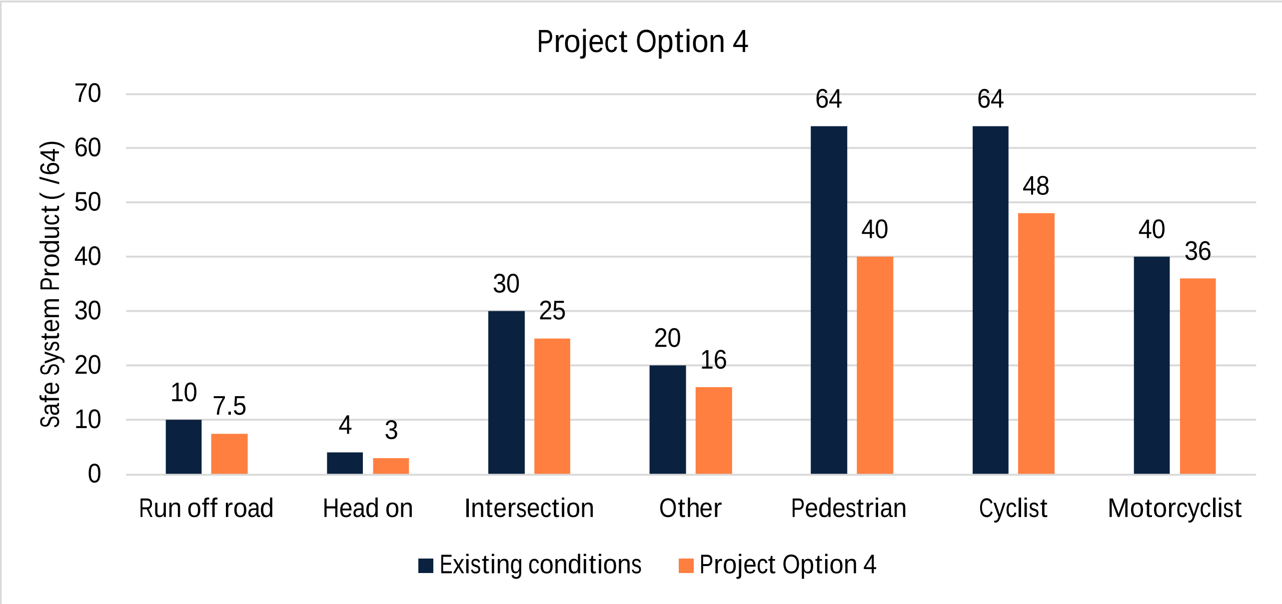


Figure 16: Project Option 4 Safe System product scores.

7. Treatments to Improve Safe System Alignment

Potential treatments to improve the proposed Project design and its alignment with Safe System Principles have been considered. These potential treatments are as outlined within the Austroads Research report AP-509-16 Safe System Assessment Framework.

For each treatment, an indication is provided on how safety is influenced, where this may be by reducing exposure (indicated with an E), likelihood (L) and/or severity (S). This information can be couple with the outputs from the assessment process to help identify appropriate treatments. Treatments have been suggested for the entire project as a whole.

7.1 Primary Treatments

Primary treatments include road planning, design and management considerations that virtually eliminate the potential of fatal and serious injuries occurring in association with the foreseeable crash types. Table 11 provides ideas for consideration and the option to which it is applicable.

Table 11: Primary treatment considerations.

Ideas for consideration	Crash types addressed	Designer response
Project Option 1 – Kerbside bicycle lanes with parking on one side		
Consider a one-way traffic lane east of Chapel Street.	Run-off-Road (E) Head-On (E, L) Intersection (E) Other (E) Motorcyclist (E)	
Project Option 2 – Kerbside bicycle lanes with parking on both sides		
Consider a one-way traffic lane east of Chapel Street and widening the cycling lanes and the physical cycling lane separators to limit dooring type crashes while maintaining parking.	Run-off-Road (E) Head-On (E, L) Intersection (E) Other (E) Motorcyclist (E) Cyclist (L)	
Project Option 3 and 3A – Kerbside parking on both sides with traffic-side bicycle lanes		
Consider a one-way traffic lane east of Chapel Street and widening the cycling lanes and the cycling lane separators to limit dooring type crashes while maintaining parking.	Run-off-Road (E) Head-On (E, L) Intersection (E) Other (E) Motorcyclist (E) Cyclist (L)	

7.2 Step Towards Treatments

Step Towards treatments include road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types, but not expected to virtually eliminate the potential of fatal and serious injuries occurring. Table 12 provides ideas for consideration and the option to which it is applicable.

Table 12: Step toward treatment considerations.

Ideas for consideration	Crash types addressed	Designer response
All Project Options:		
Consider left-in/left-out or turn bans at minor side roads to decrease right turn intersection crash exposure.	Intersection (L)	
Consider raised intersection or raised safety platform treatments at signalised intersections to slow drivers through the intersection and raise awareness of the conflict point.	Intersection (L)	

7.3 Supporting Treatments

Supporting treatments include road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types, but not expected to virtually eliminate the potential of fatal and serious injuries occurring. Supporting treatments do not change the ability for a Primary Treatment to be implemented in the future. Table 13 provides ideas for consideration and the options which it is applicable.

Table 13: Supporting treatment considerations.

Ideas for consideration	Crash types addressed	Designer response
All Project Options:		
Implement flashing LED 'Give Way to Pedestrians' signs at the pedestrian crossings to improve compliance.	Pedestrian (L)	
Consider LED TGSI's at the signalised intersections to raise right of way compliance and increase awareness of pedestrians for motorists.	Pedestrians (L)	
Consider widening pedestrian crossings at the signalised intersections to provide adequate room for pedestrians during peak periods.	Pedestrian (L)	
Consider LED pedestrian crossing road marking treatments to raise awareness of the conflict point.	Pedestrian (L)	
Project Option 4 – Minor traffic calming and safety improvements		
Change raised pavements to wombat crossings and give pedestrians priority.	Pedestrians (L)	

8. Additional Safe System Components

The other pillars that make up the Safe System include Safer Road Users and Safer Vehicles. Additional pillars, Post-Crash Care and Maintenance, are often included in the Safe System. To ensure that these additional pillars of the Safe System are considered as part of this assessment, responses to Austroads AP-R509-16 'additional Safe System components' prompts are provided in the sections below. It is noted that the items are high level and are applicable to all project sections.

8.1 Road Users

The proposed project designs are likely to keep road users engaged due to the increased requirement for input at the raised pedestrian crossings. The lower speeds, however, may increase complacency opportunity for distraction.

Compliance and enforcement of safe road users is expected to be supported by the location to the nearby police station. Enforcement activities can be safely conducted.

The Project aims to increase support for active transport users. This may introduce unfamiliar, learning, or less confident cyclists to the corridor. However, the Option selection is expected to provide the infrastructure to enable this increase in ridership.

8.2 Vehicles

The Inkerman Street corridor does have some land uses that require regular loading (supermarket, commercial areas) which introduces heavy vehicles to the corridor. However, the relative volume of these vehicles is considered low.

Weekly garbage collection is a consideration for Options 1 & 2 and how bin placement will impact collection and safe operation of the protected bicycle lanes.

There are no considerable factors that may attract large numbers of unsafe vehicles. The proposed Options are expected to satisfactorily cater for the existing and likely heavy vehicle volumes for the area.

Enforcement activities can safely be conducted. Breakdown and enforcement are expected to be catered for by the proposed Options.

8.3 Post-Crash Care

Post-crash care is likely to be adequately accommodated by the proposed Options. In congested traffic, vehicles will be able to create space for emergency vehicles to pass in all proposed Options.

The location of the site to emergency facilities is expected to grant any accident an efficient response. Emergency responses can also safely be conducted on the side of the road. There are many side streets where traffic could safely be diverted to in the event that the road had to be closed.

8.4 Maintenance

Third party maintenance of services may be required near to the roadside including:

- electrical works;
- drainage works;
- communication works;
- gas works, and
- water works.

It is noted that maintenance vehicles will not be safely contained on most of the roadside without traffic management due to the typical size of the plant involved. However, diversions and alternative routes are expected to be able to safely manage the diverted traffic.

9. Conclusion

This Safe System Assessment has explored the alignment of the Inkerman Street Safe Travel Corridor Project Option concept designs to Safe System principles. The assessment has shown the designs show an improvement in alignment with Safe System principles, indicating improved safety outcomes for all road users compared to existing conditions.

The assessment shows that pedestrian and cyclist crash types are the most benefited by the project options, with some improvements also to be delivered for motorcycles and other motor vehicles. This significant improvement for vulnerable road users (pedestrians, cyclists, and motorcyclists) under the project options shows a favourable outcome as vulnerable road users do not have mechanical systems to protect them in a crash as motor vehicles do. They must be protected in the road system.

The scores indicate that Project Option 1 (kerbside bicycle lanes with parking on one side only) presents the best overall improvement in alignment with Safe System principles for Inkerman Street, followed by Project Option 2 and then Project Option 3, 3A and Project Option 4. Option 1 and 2 present comparable improvements for pedestrian safety. All options present an improvement for motorcyclist and motor vehicle safety.

Project Option 1 provides the best overall improvement in Safe System alignment for cyclists due to several reasons. These include the wide protected kerbside bicycle lanes, reduced speed limit for motorists, and the improved set-back alignment of the bicycle lanes past local side streets, allowing for vehicles entering and exiting the side streets to prop clear of the bicycle lane and give way to cyclists separate to the motorist's turning movements at the intersection.

Project Option 4 presents the least overall improvement in Safe System alignment for cyclists, which is a key contributor in it achieving the worst product score of the 5 project options reviewed. For cyclists, contributing factors to the lower safety outcome include the lack of a physical buffer between the traffic lane and the bicycle lanes, and the need for vehicles performing parking manoeuvres to do so across the bicycle lanes.

Potential treatments that could further improve the project's alignment with Safe System principles and achieve the Victorian Road Safety Strategy goal of reducing lives lost on Victoria's roads by half before 2030 have been identified via the treatment hierarchy and are presented for consideration when moving forward with the designs.

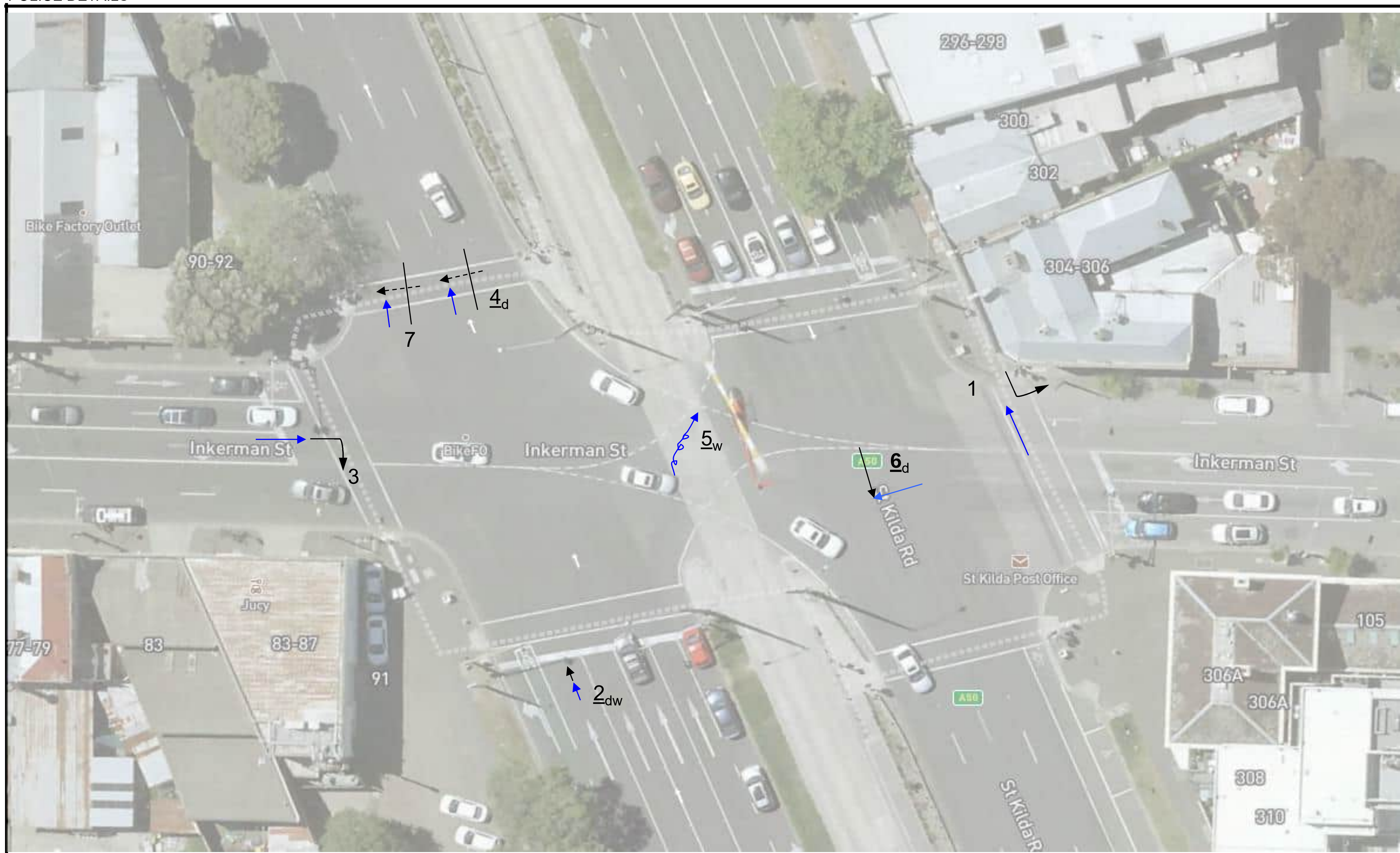
Appendix A

Crash History

INKERMAN STREET						Accidents / Year					Unit Vehicle		Road / Light		01/01/2016 - 31/12/2020			
Accident Number	Location	Chainage	Vehicle Direction	DCA Code	Other Vehicle Direction	2016	2017	2018	2019	2020	Unit 1	Unit 2	Dry / Wet	Light	Date	Week Day	Time	Type of Casualty Fatal/Serious/Other
1	On INKERMAN STREET 19m W from Int MARRIOTT STREET	507	E^	130	E*		1				Panel Van/Pole	Car/Not Applica	Dry	Dark	06/04/2017	Thu	20:00	Other injury
2	At Int of ST KILDA ROAD and INKERMAN STREET	365	NW*	122	SE^	1					Bicycle/Not App	Car/Not Applica	Dry	Day	01/04/2016	Fri	14:00	Other injury
3	At Int of ST KILDA ROAD(R) and INKERMAN STREET	332	NW*	130	NW^	1					Car/Not Applica	Station Wagon	Wet	Unk.	04/06/2016	Sat	12:30	Other injury
4	At Int of ST KILDA ROAD(R) and INKERMAN STREET	332	E^	132	E*	1					Car	Car/Not Applica	Dry	Day	04/10/2016	Tue	13:00	Other injury
5	At Int of ST KILDA ROAD(R) and INKERMAN STREET	332	E*	102		1					Taxi/Not Applic		Dry	Dusk	14/12/2016	Wed	19:25	Other injury
6	At Int of ST KILDA ROAD(R) and INKERMAN STREET	332	NW*	174	NK		1				Bicycle/Not App	Not Known	Wet	Day	03/09/2017	Sun	10:00	Other injury
7	At Int of ST KILDA ROAD and INKERMAN STREET	365	SE^	110	W*		1				Utility	Car/Not Applica	Dry	Dark	13/12/2017	Wed	21:13	**Serious injury**
8	At Int of ST KILDA ROAD and INKERMAN STREET	365	NE*	102						1	Car/Not Applica		Dry	Day	20/01/2020	Mon	10:58	Other injury
9	At Int of HENRYVILLE STREET and INKERMAN STREET	614	E^	139	E*		1				Bicycle	Station Wagon/N	Dry	Day	09/11/2017	Thu	17:20	Other injury
10	At Int of CHAPEL STREET and INKERMAN STREET	815	N*	100		1					Car/Not Applica		Dry	Day	16/06/2016	Thu	9:38	Other injury
11	At Int of CHAPEL STREET and INKERMAN STREET	815	E*	100		1					Station Wagon/N		Dry	Dark	16/07/2016	Sat	20:00	**Serious injury**
12	At Int of CHAPEL STREET and INKERMAN STREET	815	NE*	100		1					Car/Not Applica		Dry	Day	09/12/2016	Fri	18:20	**Serious injury**
13	At Int of CHAPEL STREET and INKERMAN STREET	815	NE*	121	SE^					1	Car/Not Applica	Motor Cycle/Not	Dry	Dark	13/03/2020	Fri	22:00	**Serious injury**
14	At Int of CHAPEL STREET and INKERMAN STREET	815	S*	134	S^					1	Bicycle/Not App	Tram	Dry	Day	30/03/2020	Mon	15:50	Other injury
15	On INKERMAN STREET 100m W from Int CHAPEL STREET	714	E	160	W*					1	Car/Not Applica	Car/Tree (shrub	Wet	Dark	05/09/2020	Sat	3:45	Other injury
16	On INKERMAN STREET 41m W from Int CHAPEL STREET	773	N*	147	W^			1			Car/Not Applica	Motor Cycle	Dry	Dark	12/04/2018	Thu	19:32	Other injury
17	On INKERMAN STREET 35m W from Int CHAPEL STREET	779	N*	103					1		Car/Not Applica		Dry	Day	28/06/2019	Fri	14:15	Other injury
18	At Int of CAMDEN STREET and INKERMAN STREET	918	N*	100					1		Not Known/Not A		Dry	Day	28/04/2019	Sun	17:20	Other injury
19	On INKERMAN STREET 29m E from Int CHAPEL STREET	844	E*	163	E^		1				Bicycle/Not App	Station Wagon	Dry	Day	05/10/2017	Thu	8:00	Other injury
20	On INKERMAN STREET 24m E from Int KING STREET	956	W*	171				1			Car/Tree (shrub	N/A	Dry	Day	17/01/2018	Wed	16:00	**Serious injury**
21	At Int of RAGLAN STREET and INKERMAN STREET	1092	S^	130	S*			1			Bicycle	Station Wagon/N	Dry	Day	04/01/2018	Thu	17:40	**Serious injury**
22	At Int of INKERMAN STREET and WESTBURY STREET	1270	W*	130	W^	1					Station Wagon/N	Car/Not Applica	Dry	Day	03/05/2016	Tue	8:40	**Serious injury**
23	At Int of INKERMAN STREET and MALAKOFF STREET	1391	E*	101		1					Station Wagon/N		Dry	Day	21/05/2016	Sat	14:34	**Serious injury**
24	At Int of INKERMAN STREET and WESTBURY STREET	1270	SW*	100		1					Station Wagon/N		Unk.	Day	04/09/2016	Sun	9:05	**Serious injury**
25	At Int of INKERMAN STREET and WESTBURY STREET	1270	N*	100			1				Car/Not Applica		Dry	Day	11/08/2017	Fri	10:25	**Serious injury**
26	At Int of INKERMAN STREET and WESTBURY STREET	1270	E*	100				1			Car/Not Applica		Wet	Day	13/12/2018	Thu	12:13	Other injury
27	At Int of INKERMAN STREET and WESTBURY STREET	1270	W*	100						1	Not Known/Not A		Unk.	Unk.	06/01/2020	Mon	20:30	**Serious injury**
28	At Int of INKERMAN STREET and NELSON STREET	1078	W^	137	W*			1			Bicycle	Car/Not Applica	Dry	Day	28/02/2018	Wed	9:30	Other injury
29	On INKERMAN STREET 32m E from Int CHUSAN STREET	1591	SE^	121	NW*				1		Bicycle/Not App	Car/Not Applica	Unk.	Day	18/10/2019	Fri	16:20	Other injury
30	On INKERMAN STREET 33m W from Int HOTHAM STREET	1595	E*	163	E^	1					Bicycle/Not App	Not Known	Unk.	Unk.	28/11/2016	Mon	11:00	**Serious injury**
31	At Int of HOTHAM STREET and INKERMAN STREET	1627	W^	121	E*	1					Bicycle/Not App	Car/Not Applica	Dry	Dark	31/05/2016	Tue	6:45	Other injury
32	At Int of HOTHAM STREET and INKERMAN STREET	1627	N*	113	NW^		1				Car	Car/Not Applica	Dry	Day	24/01/2017	Tue	16:12	Other injury
33	At Int of HOTHAM STREET and INKERMAN STREET	1627	S*	100			1				Station Wagon/N		Dry	Dark	06/07/2017	Thu	6:45	Other injury
34	At Int of HOTHAM STREET and INKERMAN STREET	1627	S*	100				1			Not Known/Not A		Dry	Dusk	19/01/2018	Fri	19:30	**Serious injury**
					Total	12	8	6	3	5								

POLICE DETAILS

RCIS DETAILS



1 NW*-SE^ 122 01/04/16 Fri Day 2:00:00 PM Dry Other injury
2 NW*-NW^ 130 04/06/16 Sat Unk. 12:30:00 PM Wet Other injury
3 E^-E* 132 04/10/16 Tue Day 1:00:00 PM Dry Other injury
4 E*- 102 14/12/16 Wed Dusk 7:25:00 PM Dry Other injury
5 NW*-NK 174 03/09/17 Sun Day 10:00:00 AM Wet Other injury
6 SE^-W* 110 13/12/17 Wed Dark 9:13:00 PM Dry Serious injury
7 NE*- 102 20/01/20 Mon Day 10:58:00 AM Dry Other injury

vicroads

Unit 1

Unit 2

Wet or Dark/Dusk

Fatal Accident

Serious Injury Accident

Other Injury accident

CARD

Date Range	01/01/2016 - 31/12/2020	**COLLISION DIAGRAM**	
Location	INKERMAN STREET		
Map Ref	2P E7	**Weather & Light Filter**	All Crashes
Council	PORT PHILLIP		

POLICE DETAILS

RCIS DETAILS

1 N*- 100 16/06/16 Thu Day 9:38:00 AM Dry Other injury
2 E*- 100 16/07/16 Sat Dark 8:00:00 PM Dry Serious injury
3 NE*- 100 09/12/16 Fri Day 6:20:00 PM Dry Serious injury
4 NE*-SE^ 121 13/03/20 Fri Dark 10:00:00 PM Dry Serious injury
5 S*-S^ 134 30/03/20 Mon Day 3:50:00 PM Dry Other injury

Unit 1	Wet or Dark/Dusk	Date Range	01/01/2016 - 31/12/2020
Unit 2	Fatal Accident	Location	INKERMAN STREET
	Serious Injury Accident	Map Ref	2P G7
	Other Injury accident	Council	PORT PHILLIP

COLLISION DIAGRAM

Weather & Light Filter All Crashes

vicroads

CARD

POLICE DETAILS

RCIS DETAILS

1 W*-W^ 130 03/05/16 Tue Day 8:40:00 AM Dry Serious injury
2 SW*- 100 04/09/16 Sun Day 9:05:00 AM Unk. Serious injury
3 N*- 100 11/08/17 Fri Day 10:25:00 AM Dry Serious injury
4 E*- 100 13/12/18 Thu Day 12:13:00 PM Wet Other injury
5 W*- 100 06/01/20 Mon Unk. 8:30:00 PM Unk. Serious injury

vicroads

Unit 1
Unit 2

Wet or Dark/Dusk
Fatal Accident
Serious Injury Accident
Other Injury accident

CARD

Date Range 01/01/2016 - 31/12/2020

COLLISION DIAGRAM

Location INKERMAN STREET

Map Ref 2P K8

Weather & Light Filter All Crashes

Council PORT PHILLIP

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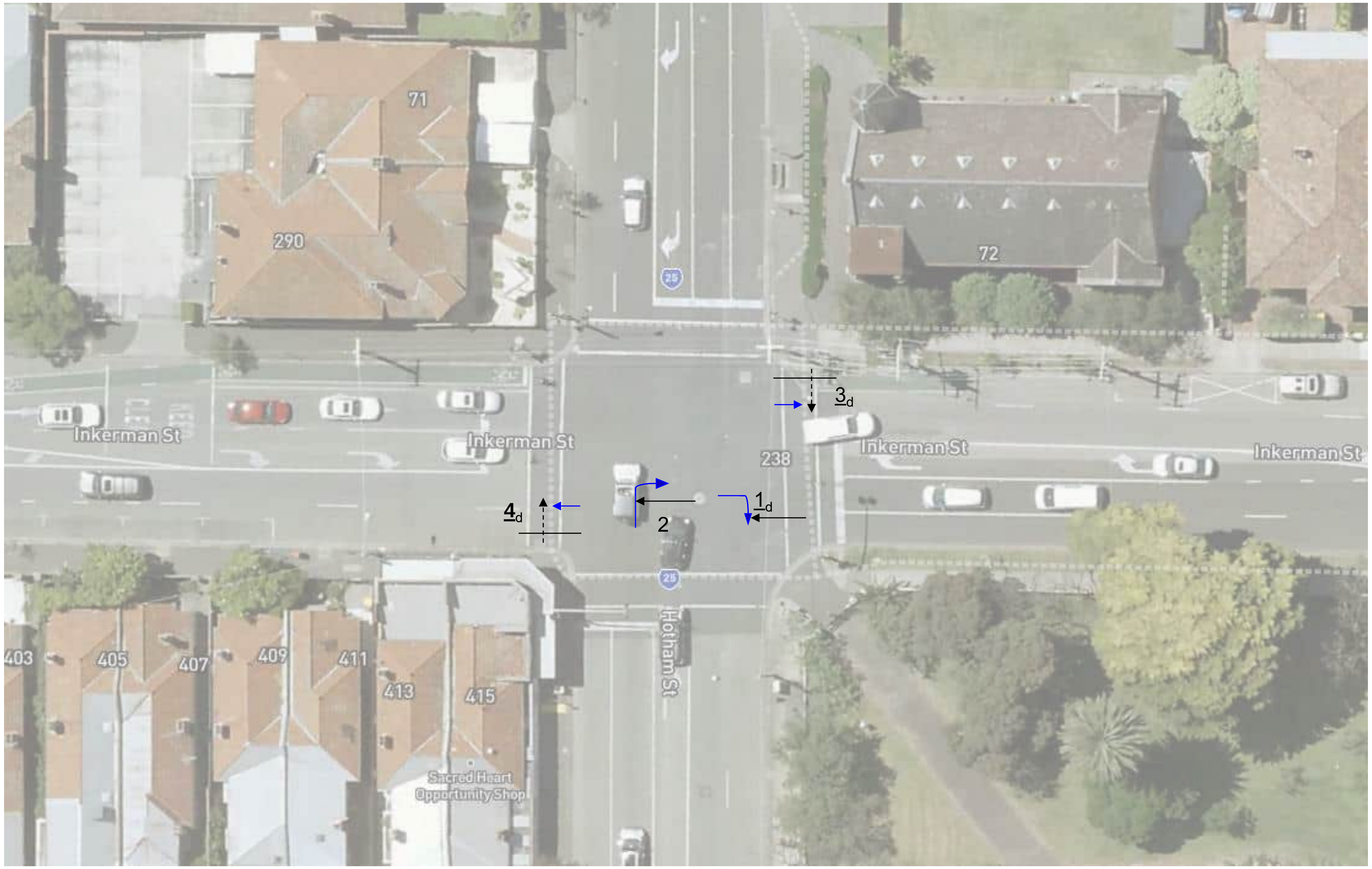
POLICE DETAILS

RCIS DETAILS



1 W^-E* 121 31/05/16 Tue Dark 6:45:00 AM Dry Other injury
2 N*-NW^ 113 24/01/17 Tue Day 4:12:00 PM Dry Other injury
3 S*- 100 06/07/17 Thu Dark 6:45:00 AM Dry Other injury
4 S*- 100 19/01/18 Fri Dusk 7:30:00 PM Dry Serious injury

Unit 1
Unit 2

Wet or Dark/Dusk
Fatal Accident
Serious Injury Accident
Other Injury accident

Date Range 01/01/2016 - 31/12/2020

COLLISION DIAGRAM

Location INKERMAN STREET

Map Ref 58 F10

Weather & Light Filter All Crashes

Council GLEN EIRA

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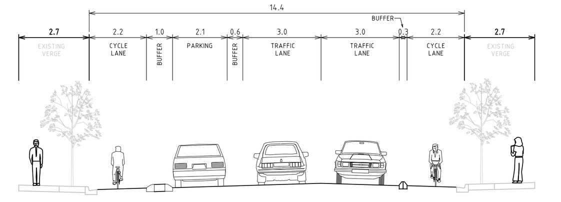
Appendix B

Project Plans



OPTION 1
2.2m CYCLE LANES, 3.0m TRAFFIC LANES

SUMMARY OF PARKING

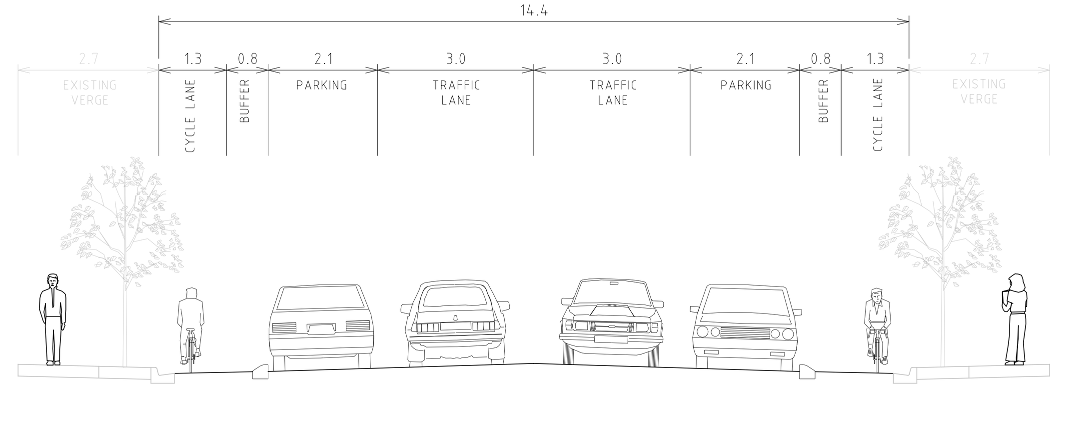
EXISTING	156
PROPOSED	64
DIFFERENCE	92

LEGEND
- MAIL ZONE SPACE
- PARKING SPACE
- DDA SPACE
- SHARE CAR SPACE
- PHYSICAL BUFFER
- GREEN PAVEMENT TREATMENT

CONCEPT DESIGN

SMEC NO. 30043159T-01-SK-0001

GENERAL NOTES	SMEC Member of the Surbana Jurong Group	DESIGNED M GORMAN APPROVED A BACKMAN	City of Port Phillip	INKERMAN STREET SAFE TRAVEL CORRIDOR CONCEPT LAYOUT PLAN OPTION 1
		CAT: SKETCH ALIGNMENT PROJ: ...30043159T/110_CADD/CAD/DGN/DRAWINGS FILE: 30043159T-01-SK-0001.dgn	SCALE OF METRES HOR 0 5 10 VER	FILE NO. 30043159T · CONTRACT NO. - · SHEET NO. · DRAWING NO. SK-0001 · ISSUE C



OPTION 2
1.3m CYCLE LANES, 3.0m TRAFFIC LANES, 0.8m BUFFER

SUMMARY OF PARKING

EXISTING	156
PROPOSED	107
DIFFERENCE	49

MAIL ZONE SPACE
PARKING SPACE
DDA SPACE
SHARE CAR SPACE
PHYSICAL BUFFER
GREEN PAVEMENT TREATMENT

CONCEPT DESIGN

SMEC NO. 30043159T-02-SK-0001

ISSUE	APP'D	DATE	AMENDMENT
C	A.B.	20.05.22	ISSUED FOR INFORMATION
B	MG	11.04.22	ISSUED FOR INFORMATION
A	MG	19.11.21	ISSUED FOR INFORMATION

GENERAL NOTES

SMEC
Member of the Surbana Jurong Group

DESIGNED M GORMAN
APPROVED A BACKMAN
CAT: SKETCH ALIGNMENT
PROJ: ...30043159T/110_CADD/CAD/DGN/DRAWINGS
FILE: 30043159T-02-SK-0001.dgn

CITY OF PORT PHILLIP

SCALE OF METRES
HOR 0 5 10
VER

INKERMAN STREET
SAFE TRAVEL CORRIDOR
CONCEPT LAYOUT PLAN
OPTION 2

FILE NO.	CONTRACT NO.	SHEET NO.	DRAWING NO.	ISSUE
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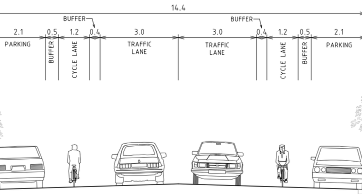

OPTION 3
1.2m CYCLE LANES, 3.0m TRAFFIC LANES, PAINTED BUFFERS

SUMMARY OF PARKING

EXISTING	156
PROPOSED	116
DIFFERENCE	40

LEGEND

- MAIL ZONE SPACE
- PARKING SPACE
- DDA SPACE
- SHARE CAR SPACE
- PHYSICAL BUFFER
- GREEN PAVEMENT TREATMENT
- RILEY KERB AND DELINEATOR

CONCEPT DESIGN

SMEC NO. 30043159T-03-SK-0001

PORT PHILLIP No

GENERAL NOTES

SMEC
Member of the Surbana Jurong Group

DESIGNED M GORMAN

APPROVED A BACKMAN

CITY OF PORT PHILLIP

CAT: SKETCH ALIGNMENT
PROJ: ...30043159T/110_CADD/CAD/DGN/DRAWINGS
FILE: 30043159T-03-SK-0001.dgn

SCALE OF METRES
HOR 0 5 10
VER

INKERMAN STREET
SAFE TRAVEL CORRIDOR
CONCEPT LAYOUT PLAN
OPTION 3

FILE NO.	CONTRACT NO.	SHEET NO.	DRAWING NO.	ISSUE
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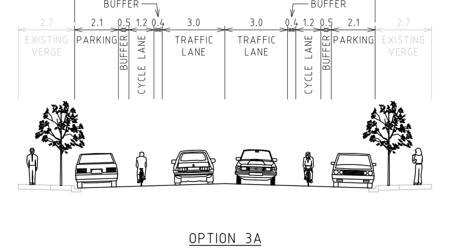


OPTION 3A
1.2m CYCLE LANES, 3.0m TRAFFIC LANES, PAINTED BUFFERS

SUMMARY OF PARKING

EXISTING	180
PROPOSED	160
DIFFERENCE	-20

LEGEND

- MAIL ZONE SPACE
- PARKING SPACE
- DDA SPACE
- SHARE CAR SPACE
- GREEN PAVEMENT TREATMENT
- PHYSICAL ISLAND

CONCEPT DESIGN

ISSUE	APP'D	DATE	AMENDMENT
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

GENERAL NOTES

SMEC
Member of the Surbana Jurong Group

SMEC NO. 30043159T-03A-SK-0001

DESIGNED A BACKMAN
APPROVED L SMITH

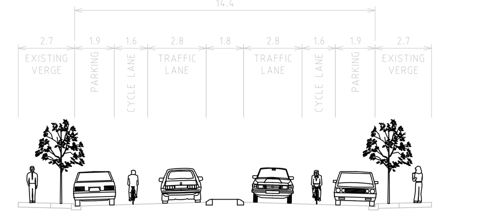
CAT: SKETCH ALIGNMENT
PROJ: ...30043159T/110_CADD/CAD/DGN/DRAWINGS
FILE: 30043159T-01-SK-0003A.dgn

SCALE OF METRES
HOR 0 5 10
VER

CITY OF PORT PHILLIP

INKERMAN STREET
SAFE TRAVEL CORRIDOR
CONCEPT LAYOUT PLAN
OPTION 3A

FILE NO. 30043159T
SHEET NO.
DRAWING NO. SK-0003A
ISSUE -



OPTION 4
EXISTING CROSS SECTION: 1.6m CYCLE LANES, 2.8m TRAFFIC LANES

SUMMARY OF PARKING

EXISTING	180
PROPOSED	180
DIFFERENCE	NIL

LEGEND

GREEN PAVEMENT TREATMENT	(green)
PHYSICAL ISLAND	(orange)

CONCEPT DESIGN

ISSUE	APP'D	DATE	AMENDMENT
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

GENERAL NOTES

SMEC
Member of the Surbana Jurong Group

DESIGNED A BACKMAN
APPROVED L SMITH
CAT: SKETCH ALIGNMENT
PROJ: ...30043159T/110_CADD/CAD/DGN/DRAWINGS
FILE: 30043159T-01-SK-0004.dgn

SMEC NO. 30043159T-04-SK-0001

CITY OF PORT PHILLIP

SCALE OF METRES
HOR 0 5 10
VER

INKERMAN STREET
SAFE TRAVEL CORRIDOR
CONCEPT LAYOUT PLAN
OPTION 4

FILE NO.		SHEET NO.	DRAWING NO.	ISSUE
30043159T			SK-0004	-

Appendix C

Site Photographs

Figure C–1: Inkerman Street west end of corridor facing east.

Figure C–2: Inkerman Street west end of corridor facing west.

Figure C–3: Inkerman Street mid-way along corridor facing east.

Figure C–4: Inkerman Street mid-way along corridor facing west.

Figure C–5: Inkerman Street east end of corridor facing east.

Figure C–6: Inkerman Street east end of corridor facing east.

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