Hawkesbury City Council

ordinary meeting supplementary business paper

date of meeting: 12 November 2019
location: council chambers
time: 6:30 p.m.

ORDINARY MEETING

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Meeting Date: 12 November 2019

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SECTION 3 – Reports for Determination

SUPPLEMENTARY REPORT

Item: 204 **GM - Request for Modifications - Windsor Bridge Replacement Project - (80093, 79351)**

Previous Item: 270, Ordinary (29 October 2019)

Directorate: General Manager

REPORT:

Context and Background

Council considered a Mayoral Minute regarding the subject matter at its meeting on Tuesday, 29 October 2019 – refer to Item 203 Windsor Bridge Replacement Project – Request for a Modification.

After considering the Mayoral Minute, Council resolved as follows:

"That Council:

1. *Urgently contact, RMS, relevant State Agencies and the Local Member for Hawkesbury, Robyn Preston MP to hold a joint meeting to discuss in person the:*

    a) *Suspension of the assessment of the application until such time as the following additional information has been provided:*

        (i) *Traffic data (movements, numbers and time of day) that relates to a more realistic project catchment, including:*
        - *Court Street and related access roads to the Governor Philip Boat Ramp*
        - *Bridge Street to Fitzroy Bridge, South Creek*
        - *Bridge Street to the Wilberforce Road/Freemans Reach Road intersection*
        - *Macquarie Street to Kable Street*

        (ii) *Details of the 2017 and 2019 Traffic Surveys, together with:*
        - *A summary of the differences between them*
        - *Details of the actual counts (date and time) that informed those differences*

        (iii) *Details of:*
        - *The status of the previously proposed Stage 2 works on Fitzroy Bridge that involved the conversion of the existing Fitzroy Bridge pedestrian walkway to an additional traffic lane.*
        - *Options and cost estimates considered as part of the process of adopting the currently preferred option, including details of options considered to eliminate and/or reduce the area of Thompson Square proposed to be alienated by the proposed road/bridge widening.*
        - *Options for responding to the provisions of the Thompson Square Conservation Management Plan.*

2. *Request an extension of the submission period to ensure the public have had adequate time to view the information.*

3. Express its concern to the RMS about the very narrow timeframe in which to lodge a submission.

4. Request this matter be returned to Council at the following meeting to update the responses received and to enable members of the public to address Council on the matter."

Current Position

Letters were subsequently forwarded to the Local Member for Hawkesbury, Robyn Preston, the Department of Planning, Industry and Environment and the Roads and Maritime Services.

Responses have since been received from the Roads and Maritime Services and the Department of Planning Industry and Environment. – Refer Attachments 1 and 2.

The Mayor also met with the Local Member last Friday at which time the Local Member confirmed that:

> "*whilst that these issues will require new funding, the Local Member is happy to arrange a meeting involving the Mayor, RMS and the Local Member, to discuss a holistic approach to traffic from Pitt Town to Windsor Bridge, which may be a staged traffic solution."*

The above information has been provided to:

- allow this matter be returned to Council at the following meeting
- to provide an update on the responses received
- to enable members of the public to address Council on the matter.

RECOMMENDATION:

That the report be received and noted.

ATTACHMENTS:

AT - 1 Roads and Maritime Services - Proposed Modification to Windsor Bridge Replacement Project.

AT - 2 Department of Planning, Industry and Environment - Proposed Modification to Replacement Windsor Bridge.

AT - 2 Department of Planning, Industry and Environment - Proposed Modification to Replacement Windsor Bridge

Robyn Felsch

From: David Gainsford [redacted]
Sent: Tuesday, 5 November 2019 1:07 PM
To: Robyn Felsch; Cathy Mills
Cc: Tamzyn Bartlett; Glenn Snow; Andrew Beattie; Melinda Donaldson
Subject: RE: Proposed Modification to Replacement Windsor Bridge

Dear Mr Conroy,

I refer to your letter regarding Council's resolution (Item 203) on the proposed modification to the Windsor Bridge Replacement project, which is on exhibition until 7 November 2019.

In your letter you raised matters in relation to traffic data and surveys, and the options and status of a number matters. I understand that these matters have also been raised with RMS and are appropriately addressed by RMS. In this respect, can you advise the Department if you would like this letter to be considered as a submission to the exhibition of the modification.

I can also advise that the Department has exceeded its statutory requirements in relation to the exhibition time frame of the modification and will not be extending the exhibition period. Notwithstanding, should Council wish to lodge further advice on this matter, the Department can receive a late submission until the 14 November 2019.

As requested, could you please contact Mr Glenn Snow, Director Transport Assessments on the status of a Council Submission at glenn.snow@planning.nsw.gov.au.

Regards

David Gainsford
Executive Director Infrastructure – Planning and Assessment
Department of Planning, Industry & Environment
320 Pitt Street | GPO Box 39 SYDNEY NSW 2001
T [redacted] **M** [redacted] **E** [redacted]

www.dpie.nsw.gov.au

NSW GOVERNMENT | Planning, Industry & Environment

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Cathy Mills **On Behalf Of** Robyn Felsch
Sent: Friday, 1 November 2019 10:56 AM
To: David Gainsford
Subject: Proposed Modification to Replacement Windsor Bridge

Please find attached Council's letter regarding this matter.

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oooO END OF REPORT Ooo

ordinary meeting

end of supplementary business paper

This business paper has been produced electronically to reduce costs, improve efficiency and reduce the use of paper. Internal control systems ensure it is an accurate reproduction of Council's official copy of the business paper.

Hawkesbury City Council

Attachment 1 to item 204

Proposed Modification to Windsor Bridge Replacement Project

date of meeting: 12 November 2019
location: council chambers
time: 6:30 p.m.

Transport
Roads & Maritime
Services

5 November 2019

Mr Peter Conroy
General Manager
Hawkesbury City Council
PO Box 146
Windsor NSW 2756

Dear Mr Conroy

Proposed Modification to Windsor Bridge Replacement Project

Thank you for your letter of 31 October 2019 about the proposed modification to the Windsor Bridge Replacement project.

The timing of the exhibition of the Modification is determined by the Department of Planning, Industry and Environment (DPIE) in accordance with its procedures and guidelines. Therefore Council's request for an extension of time to make a submission on the Modification would need to be directed to the DPIE.

It is also suggested that Council include any matters for which it would like further information in its submission. These matters can be addressed as part of the submissions report and would also be included in the DPIE's assessment of the Modification.

Regardless, information concerning traffic assessment and other matters of environmental assessment raised in your letter are provided in Attachment A.

I welcome the opportunity to further meet with Council to discuss the matters raised and I am liaising with Ms Robyn Felsch to convene the meeting.

For further information, please contact me on mobile 0421 044 177.

Yours sincerely

Graham Standen
Senior Project Manager

RESPONSE TO COUNCIL'S QUERY – TRAFFIC MATTERS AND OTHER AREAS OF ENVIRONMENTAL ASSESSMENT

TRAFFIC MATTERS

One of the key objectives for the Windsor Bridge replacement project is to improve traffic efficiency and reduce traffic delay and congestion. Significant time has elapsed since the initial traffic assessment for the project was undertaken for the Environmental Impact Statement (EIS) in 2012. As a result an updated traffic assessment was undertaken in 2017 and reported in the Acardis traffic report dated March 2018. This is standard practice when project timeframes extend. This assessment included the collection of new traffic count data as well as queue lengths and travel time surveys.

The Arcadis traffic report of March 2018 reaffirmed and supported the EIS assessment that the approved project would

- provide effective traffic improvements to all the key intersections of Wilberforce Rd/ Freeman Reach Rd, Bridge Street/George Street and Bridge Street/ Macquarie St in the AM peak,
- as well as effective traffic improvement to the Wilberforce Rd/ Freeman Reach Rd intersection in the PM peak.

However, the 2018 traffic report identified that the approved project would not provide adequate traffic improvements for projected traffic volumes for the Bridge Street/George Street intersection, as well as Bridge Street/ Macquarie St, in the PM peak. The data for project growth rates was taken from the Roads and Maritime Strategic Traffic Forecast Model (EMME model) that is used to assist in forecasting traffic growth across the Greater Sydney network. This model takes into account journey to work data from the latest available census data as well as known changes to land use.

To validate the 2017 traffic data and assessment further traffic counts were undertaken in August 2019. The 2019 traffic counts validated the outcomes of the 2017 traffic data and assessment.

Under existing conditions motorists experience significant delays and queuing travelling north bound crossing the existing Windsor Bridge. The 2018 traffic report shows that the originally approved signalised intersection of the Bridge St/George St intersection with only one northbound through lane will not provide sufficient capacity in the PM peak into the future.

The Arcadis traffic report of March 2018 also identified an option where widening for a small area of additional pavement (160 m2) of Bridge St, on the northern side of the George St intersection, would allow for 2 northbound through lanes for the signalised intersection with a merge north of the intersection to a single northbound lane over the new bridge. The assessment shows that this minor modification would provide substantive improvement in capacity and level of service for the projected future traffic conditions.

The following responds to the matters that have been raised by Council.

Court Street and related access roads to Governor Phillip Boat Ramp

Access to the Governor Phillip Boat Ramp and Court Street will be as follows:

- Northbound vehicles on Bridge St will still be permitted to turn right into Court Street. These vehicles will not be able to turn right into George Street east.
- Southbound vehicles less than 9 metres in length travelling south across the new bridge will be able to turn left into George Street.
- Southbound vehicles longer than 9 metres in length travelling south across the new bridge will need to continue past George Street and turn left into Court Street.

The March 2018 traffic study by Arcadis, which is appended to the Modification report, includes an assessment of the Bridge Street/Court Street intersection and the Bridge Street/George Street intersection.

Bridge Street to the Fitzroy Bridge, South Creek

The Acardis traffic study of 2018 re-assessed the traffic performance and capacity of Bridge St/ Macquarie St and Bridge St / George St intersections. Details are available in the Modification report.

Bridge Street to the intersection of Wilberforce Road and Freeman Reach Road.

The Arcardis traffic study 2018 confirmed that the current approved design for a 2 lane roundabout at the intersection of Bridge Street, Wilberforce Road and Freeman's Reach Road will provide a high level of service (Level of Service B in both AM and PM peaks in 2036).

Macquarie Street to Kable St

The Arcardis traffic study 2018 shows that the proposed modification would provide some additional improvement in the performance of the Macquarie Street / Bridge Street intersection. In particular during the afternoon peak, being the key period of delay.

Details of 2017 and 2019 Traffic Surveys

The full Arcadis traffic study is included in the Modification report that is displayed on the DPIE and the Roads and Maritime project websites. Details of the 2019 traffic survey are attached.

A comparison of the 2017 and 2019 traffic data produced no material differences.

Future Traffic Improvements on Fitzroy Bridge over South Creek.

Network improvement to the Fitzroy Bridge is outside the scope of this project. Roads and Maritime currently has no network improvement planned for the provision of an additional traffic lane on the Fitzroy Bridge.

ENVIRONMENTAL ASSESSMENT OF THE NORTHBOUND MERGE OPTION

Options and Cost Estimate of the Proposed Modification

The options considered are detailed in Section 9.2 of the Modification report. The feasible options were:

Option 1: do nothing being no change to the approved design

Option 2: the proposal as detailed in the Modification report

A third option to provide an additional north bound lane from Bridge Street across the new bridge was considered but was deemed to be unacceptable and unnecessary.

Option 2 being the provision of an additional northbound through lane at the Bridge St / George Street intersection and the additional merge lane between the intersection and the new bridge is considered to be the appropriate option. It would provide traffic benefits into the future and would have minimal impact on Thompson Square.

The new pavement and kerb construction is not scheduled to commence until mid-2020 and therefore if approved there is adequate time to locally modify the design without causing delay to the works.

As the pavement widening area is only minor (160 m2) the additional cost of the works is estimated to be approx. $100,000. The modification however is estimated to deliver substantive saving in travel time costs over the lifecycle of the project.

Environmental Assessment

Environmental assessment of the proposed modification has been undertaken with consideration to the provision of the Environmental Planning and Assessment Act and the Thompson Square Strategic Conservation Management Plan.

Specialist studies have been undertaken and included in the Modification report to address key environmental impacts associated with the proposed modification. In summary these impacts are as follows.

Heritage Impact

As mentioned above, the additional pavement widening is limited to 160m2. For the northern (or lower part) section of the pavement widening, the work will be within an area that currently comprises the existing Bridge St Roadway. The existing roadway built in the 1930s is expected to have already disturbed potential heritage finds in this location. As well, the new pavement is at a higher level than the existing roadway in this area requiring this area to be filled rather than excavated below the existing ground surface.

For the southern or upper section of the proposed northbound merge pavement widening, mitigation measures have been proposed to mitigate the potential impact on heritage.

Heritage and archaeological management procedures for inspection and monitoring for the works will be equivalent to those currently approved as part of the project's Construction Heritage Management Sub-plan.

Overall the heritage impact of the proposed modification works has been assessed as not being significant.

In accordance with the Conditions of Approval for the project, a Strategic Conservation Management Plan was prepared and approved by the Director General of the Department of Planning. This plan was developed in consultation with the Heritage Division of the then Office of Environment and Heritage.

The project Strategic Conservation Management Plan outlines the

- the heritage principles for the project to retain the heritage significance of Thompson Square
- specific mitigation measures for Thompson Square and individual listed items to mitigate impact

The proposed modification has been developed to meet the above principles.

Noise Impact

The proposed modification has been assessed and will be no discernible change in impacts from that of the approved project.

Existing Trees and Vegetation

The proposed modification does not require the removal of any additional trees and all additional planting as currently detailed in the landscape design will be provided.

Urban Design

The visual impact assessment determined that the proposed Modification would not present any significant additional visual impact.

Artist perspectives providing a visual comparison of views of the parkland for the approved project and the proposed modification have been included with the Modification report and the Community Update that was distributed across the local area in October 2019.

Strategic Conservation Management Plan

In accordance with the Conditions of Approval for the project, a Strategic Conservation Management Plan was prepared and approved by the Director General of the Department of Planning. This plan was developed in consultation with the Heritage Division of the then Office of Environment and Heritage.

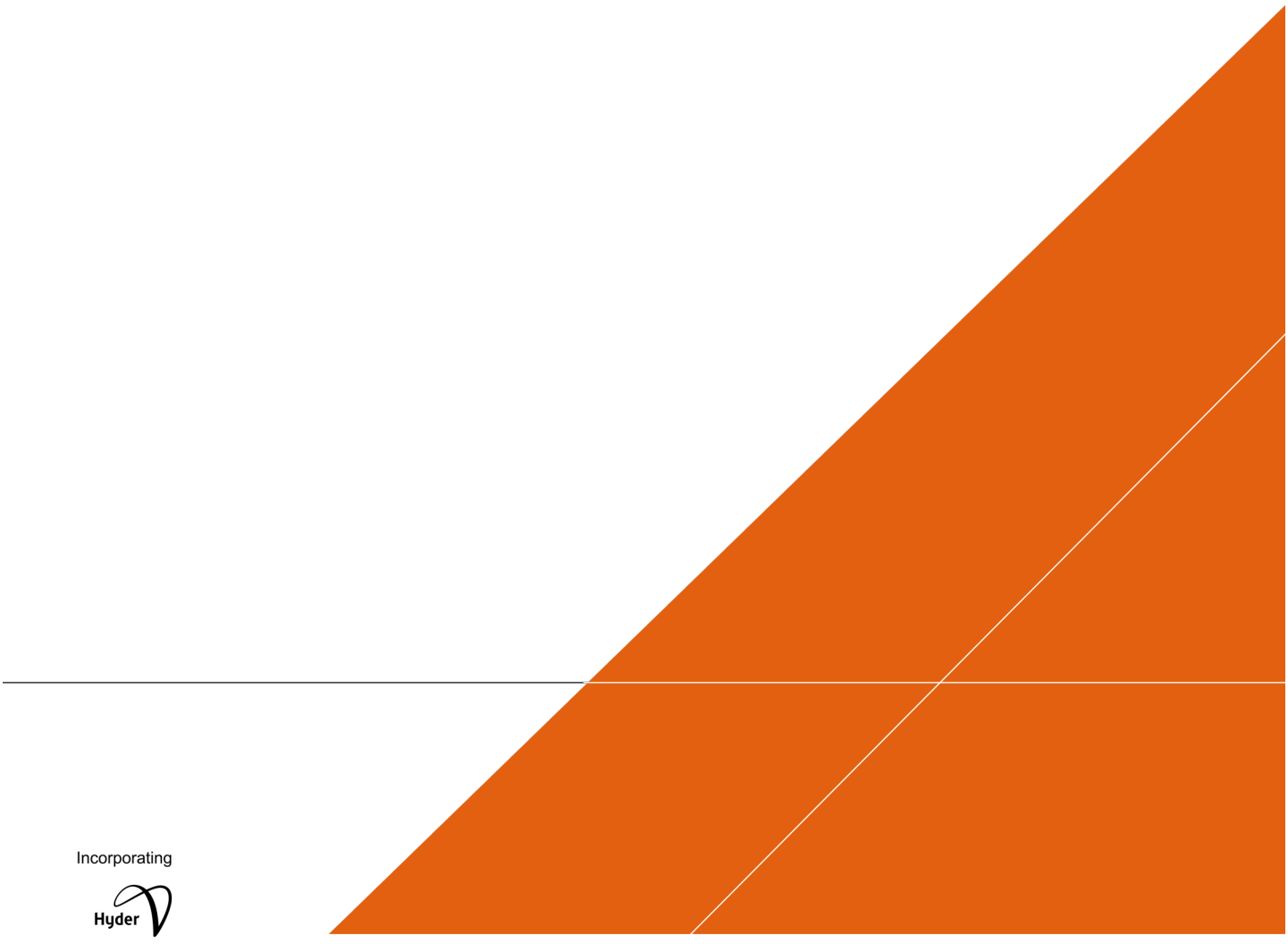
The project Strategic Conservation Management Plan outlines the heritage principles and policies to retain the heritage significance of Thompson Square

The proposed modification has been developed to meet these principles and policies.

ARCADIS Design & Consultancy for natural and built assets

Windsor Bridge Replacement Project

Traffic Counts Data Comparison Between 2017 and 2019



Incorporating Hyder

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ROADS AND MARITIME SERVICES (ROADS AND MARITIME)
Windsor Bridge Replacement Project

Traffic Counts Data Comparison Between 2017 and 2019

Author	Roy Conrad	[redacted]
Checker	Mukit Rahman	[redacted]
Approver	Mukit Rahman	[redacted]
Report No	10005593	

REVISIONS

Revision	Date	Description	Prepared by	Approved by
A	Sept 2019	Draft for internal review	RC	MR
B	Sept 2019	Draft for client review	RC	MR
C	29 Oct 2019	Final Report	RC	MR

CONTENTS

1 Background

In 2017, Arcadis Australia Pacific (Arcadis) assisted Roads and Maritime Services (Roads and Maritime) on a traffic modelling study for the proposed Windsor Bridge Replacement project (the 'project'). To support the project, traffic data was collected in March 2017 which included daily automatic traffic counts, intersection turning movement counts, queue length surveys and travel time surveys.

The results of these counts and surveys were documented in '*Windsor Bridge Replacement Project, Traffic and Options Modelling Report*' prepared by Arcadis in March 2018 (hereinafter referred as the '2018 Report').

At that time, the decision was as made not to proceed with the "zip" or merge lane and instead undertake traffic counts in the future.

2 Report purpose

This technical advice memo has been prepared to document traffic changes on Windsor Bridge and four nearby intersections between 2017 and 2019.

The report has documented findings in the following areas including:

- An assessment of the traffic survey data collected in August 2019
- A comparison of the 2019 traffic survey results against the results of the 2017 traffic surveys
- Identification of changes in traffic patterns between 2017 and 2019 across the road network within the study area, and the provision of commentary on the changes in traffic patterns where required.

The 2017 and 2019 traffic data has been compared across the following factors:

1. Daily traffic volumes on the Windsor Bridge
2. Daily heavy vehicles proportions on the Windsor Bridge
3. Morning (AM) and afternoon (PM) peak hour traffic volumes on the Windsor Bridge
4. Peak hour traffic volumes at four intersections on Bridge Street / Wilberforce Road with Freemans Reach Road, George Street, Macquarie Street and Court Street
5. Peak hour travel time and travel speed on the section of Bridge Street / Wilberforce Road between Court Street and Freemans Road
6. Peak hour queue lengths on intersection approach roads at four locations including Bridge Street / Wilberforce Road intersections with Freemans Reach Road, George Street, Macquarie Street and Court Street.

This technical document should be read in conjunction with Section 3 of the 2018 Report, which was prepared using the traffic survey data collected in March 2017.

3 Reference traffic data used

This analysis was based on the following data and reference material:

- The 2017 traffic survey was undertaken in March 2017
- The 2019 traffic survey was undertaken in August 2019.
- *Windsor Bridge Replacement Project, Traffic and Options Modelling Report, Section 3,* Arcadis, March 2018.

A summary of the location, duration, dates and data collected for the traffic surveys completed in 2017 and 2019 are provided in Table 3-1.

Table 3-1 Traffic survey details - 2017 and 2019

Survey Type and Location		Date / Time / Duration	
		March 2017	August 2019
1	Daily midblock traffic counts on Windsor Bridge	Friday 24 March 2017 to Thursday 30 March 2017	Tuesday 6 August 2019 to Monday 12 August 2019
		Continuous seven-day period	
2	Intersection counts and queue length surveys 1. Wilberforce Road / Freemans Reach Road intersection 2. Bridge Street / George Street intersection 3. Bridge Street / Macquarie Street intersection 4. Bridge Street / Court Street intersection	Tuesday 28 March 2017 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)	Tuesday 6 August 2019 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)
3	Travel time and travel speed surveys for one bi-directional route A 1.5km section of Bridge Street and Wilberforce Road, between 500 metres south of Court Street / Bridge Street intersection and 500 metres east of Freemans Road / Wilberforce Road intersection	Tuesday 28 March 2017 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)	Tuesday 6 August 2019 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)

Figure 3-1 below shows the location of each of the traffic surveys within the study area.

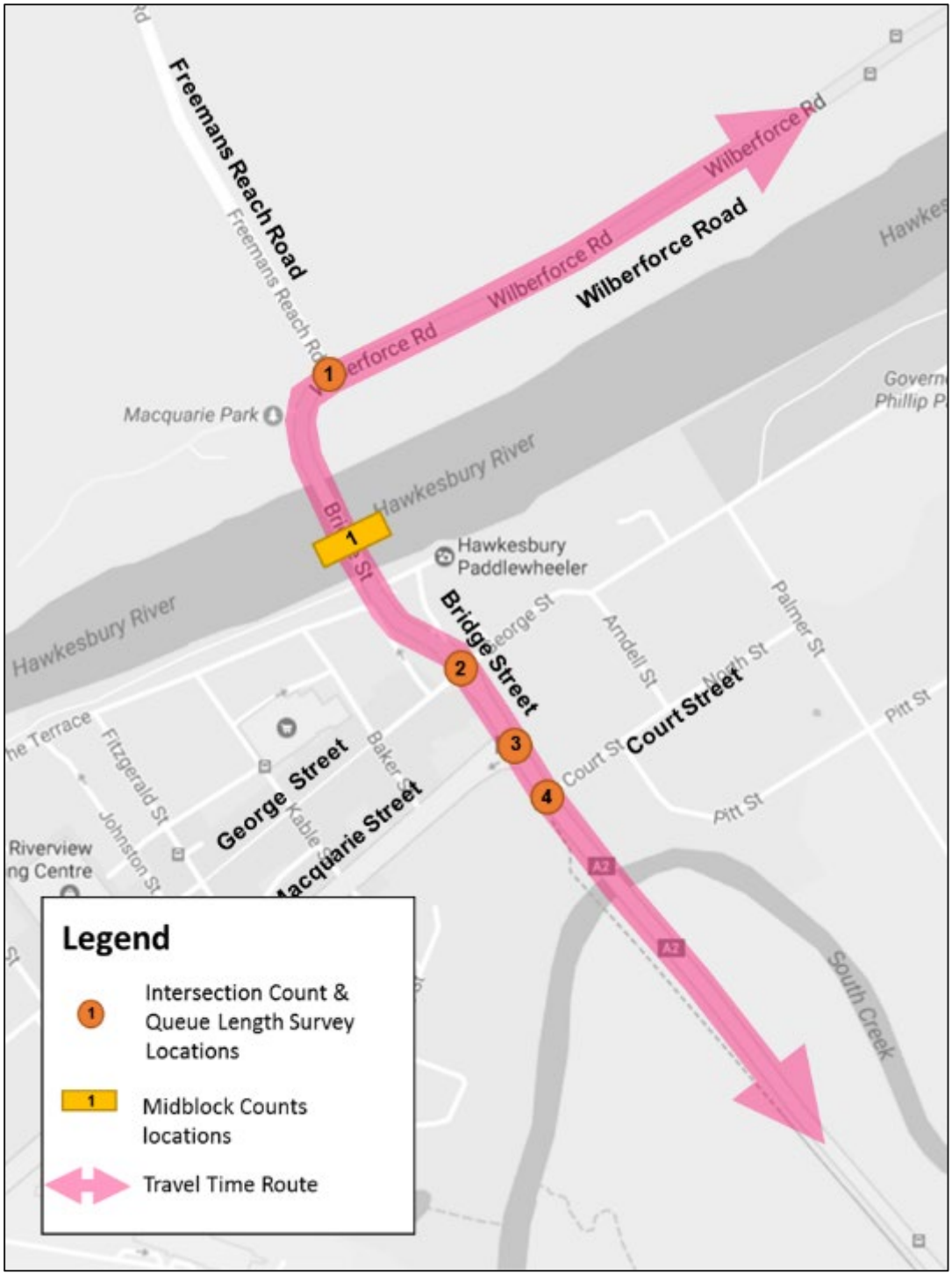

Figure 3-1 Traffic survey locations within the study area

4 Data analysis and results

The analysis and comparison of the March 2017 and August 2019 traffic survey data are discussed in this section.

4.1 Daily traffic volume on the Windsor Bridge

Midblock traffic counts were undertaken on the Windsor Bridge for a continuous seven-day period. These traffic counts were conducted at the same location in March 2017 and August 2019, as shown in Figure 3-1.

Figure 4-1 and Table 4-1 shows comparison of daily traffic volumes on the Windsor Bridge in 2017 and 2019.

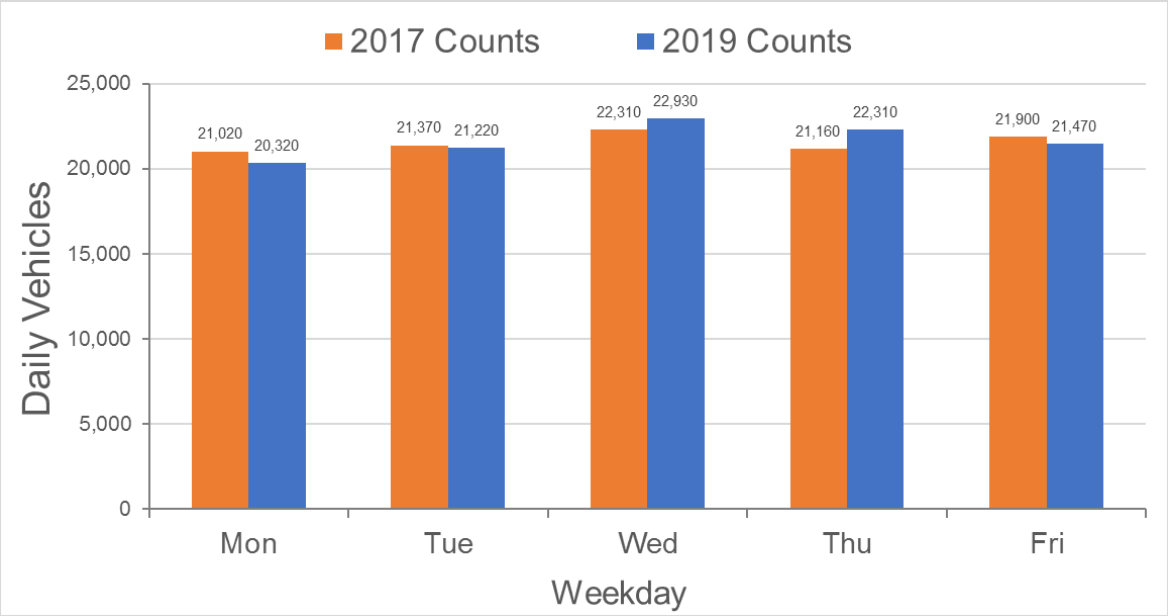

Figure 4-1 Weekday daily traffic volumes on Windsor Bridge in 2017 and 2019

Table 4-1 Weekday daily traffic volumes on Windsor Bridge in 2017 and 2019

Daily vehicle Volumes on Windsor Bridge	Survey Year		Traffic Change between survey periods	
	2017	2019	No. of Vehicles	%
Monday	21,020	20,320	- 700	-3% ▼
Tuesday	21,370	21,220	- 150	-1% ▼
Wednesday	22,310	22,930	+ 620	3% ▲
Thursday	21,160	22,310	+ 1,150	5% ▲
Friday	21,900	21,470	- 430	-2% ▼
Average weekday (5-day) traffic	**21,550**	**21,650**	**+ 100**	**0.5% ▲**

Note: Volumes have been rounded to the nearest 10 vehicles.

The results of the traffic surveys on the Windsor Bridge between 2017 and 2019, indicate the following trends:

- Traffic volumes on the Windsor Bridge varied from Monday to Friday by one per cent to five per cent each day
- When considering the five-day weekday average, traffic volumes on Windsor Bridge have increased from 21,550 vehicles in 2017 to 21,650 vehicles in 2019
- Across the two time periods, traffic on Windsor Bridge has increased by 100 vehicles (0.5 per cent) per day. This suggests that the overall traffic volumes have remained relatively consistent between 2017 and 2019.

4.1.1 Heavy vehicles on the Windsor Bridge

Vehicle volumes with regards to their Austroads class were also assessed across the weekday period, with vehicles recorded as class 1 or 2 considered to be 'light' vehicles, and vehicles recorded as classes 3 or above considered to be 'heavy' vehicles.

Vehicle classes and their corresponding volumes over the five-day weekday period for 2017 and 2019 are provided in Table 4-2.

Table 4-2 Daily heavy vehicles proportion on Windsor Bridge

Vehicle Classification	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
All Traffic Classes	21,550	21,650	100	0.5% ▲
Light Vehicles	19,180	18,860	-320	-2% ▼
Heavy Vehicles	2,370	2,790	420	18% ▲
% Heavy Vehicles	11%	13%	2% increase in heavy vehicle proportion of total vehicles	

Note: Volumes have been rounded to the nearest 10 vehicles. Volumes on Windsor Bridge are based on average weekday (5-day, Monday to Friday) traffic.

The review of the vehicle classification volumes indicates that:

- On average, the weekday heavy vehicles on the Windsor Bridge have increased from 2,370 in 2017 to 2,790 in 2019, representing an overall increase of 420 vehicles (18 per cent)
- Light vehicle volumes across the Windsor Bridge have decreased by two per cent between 2017 and 2019
- The overall proportion of heavy vehicles on the Windsor Bridge have increased from 11 per cent in 2017 to 13 per cent in 2019, representing an overall increase of two per cent over this time period.

4.2 Peak hour volumes on Windsor Bridge for average weekday traffic

In order to evaluate the change in traffic volumes during peak periods, the changes in the peak AM hour and PM hour were assessed using the average weekday (five-day, Monday to Friday) traffic volumes.

Table 4-3 shows the peak one-hour two-way traffic volumes on the Windsor Bridge for AM peak (8-9 AM) and PM peak (4-5 PM).

Table 4-3 Peak one-hour volumes on Windsor Bridge (two way)

Peak One-Hour Volumes (Two-way)	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
8-9 AM	1,480	1,530	50	3% ▲
4-5 PM	1,790	1,760	-30	-2% ▼
Combined peak hour total (AM peak + PM peak)	3,270	3,290	20	1% ▲

Note: Volumes have been rounded to the nearest 10 vehicles. Peak hour traffic volumes on Windsor Bridge are based on average weekday (5-day, Monday to Friday) traffic.

The peak hour volume analysis suggests that:

- In the AM peak period between 2017 and 2019, traffic volumes on Windsor Bridge have increased by 50 vehicles over the hour (three per cent)
- In the PM peak period, traffic volumes on Windsor Bridge have decreased 30 vehicles (-2 per cent)
- When considering both the AM and PM peak hour, traffic volumes on Windsor Bridge have marginally increased by about 20 vehicles (one per cent)
- Across the two time periods, the peak hour volumes have remained relatively consistent across Windsor Bridge.

The peak hour traffic volumes on Windsor Bridge are further analysed in northbound and southbound directions. Table 4-4 and Table 4-5 show the directional peak hour traffic volumes on the Windsor Bridge for AM peak (8-9 AM) and PM (4-5 PM) peak respectively.

Table 4-4 Directional peak one-hour volumes on Windsor Bridge 8-9 AM

Survey Year	AM PEAK HOUR (8AM-9 AM)		
	Northbound /Eastbound	Southbound /Westbound	Two-way
March 2017	430	1,050	1,480
August 2019	480	1,050	1,530
Traffic change in two years	50	0	50
	12% ▲	0% ▶	3% ▲

Note: Volumes have been rounded to the nearest 10 vehicles.

Table 4-5 Directional peak one-hour volumes on Windsor Bridge 4-5 PM

Survey Year	PM PEAK HOUR (4PM-5PM)		
	Northbound /Eastbound	Southbound /Westbound	Two-way
March 2017	1,220	570	1,790
August 2019	1,210	550	1,760
Traffic change in two years	-10	-20	-30
	-1% ▼	-4% ▼	-2% ▼

Note: Volumes have been rounded to the nearest 10 vehicles.

The directional peak hour volume analysis indicates that:

- In the AM peak period, traffic volumes on Windsor Bridge have by 50 vehicles over the hour (12 per cent) increased in the northbound direction, with no change in traffic volumes in the southbound direction
- In the PM peak period, traffic volumes on Windsor Bridge have decreased by 10 vehicles (-1 per cent) in the northbound direction and decreased by 20 vehicles (-4 per cent) in the southbound direction

The daily and peak hour traffic volumes analysis indicates Windsor Bridge has experienced minor changes in traffic volumes 2017 and 2019. The analysis demonstrates there has been no substantial increase or decrease in traffic volumes at this location.

4.3 Intersection peak hour volumes

Intersection volume counts were undertaken at the following sites in March 2017 and August 2019:

- Wilberforce Road / Freemans Reach Road
- Bridge Street / George Street
- Bridge Street / Macquarie Street
- Bridge Street / Court Street.

Table 4-6 and Table 4-7 compares total intersection volumes at four sites for AM peak hour (8-9 AM) and PM peak hour (4-5 PM) hour respectively.

Table 4-6 Total intersection volumes – AM Peak

Intersections	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
A. Freemans Reach Rd / Bridge St	1,530	1,460	-70	-5% ▼
B. George St / Bridge St	1,670	1,580	-90	-5% ▼
C. Macquarie St / Bridge St	2,390	2,360	-30	-1% ▼
D. Bridge St / Court St	1,860	1,870	10	1% ▲
Total for all sites	**7,450**	**7,270**	**-180**	**-2% ▼**

Note: Volumes have been rounded to the nearest 10 vehicles.

Table 4-7 Total intersection volumes – PM Peak Period

Intersections	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
A. Freemans Reach Rd / Bridge St	1,780	1,750	-30	-2% ▼
B. George St / Bridge St	1,910	1,900	-10	-1% ▼
C. Macquarie St / Bridge St	2,290	2,330	40	2% ▲
D. Bridge St / Court St	1,620	1,760	140	9% ▲
Total for all sites	**7,600**	**7,740**	**140**	**2% ▲**

Note: Volumes have been rounded to the nearest 10 vehicles.

The intersection volumes analysis indicates that:

- Between 2017 and 2019, intersection volumes during the AM peak varied between – 5 percent to 9 per cent, with the total traffic volumes across the four locations decreasing by 180 vehicles over this time period
- In the PM peak, the total volumes for all four locations increased by 140 vehicles (two per cent) between 2017 and 2019
- The peak hour traffic volume change across the four intersections is minor, with a 2 per cent increase observed between 2017 and 2019.

4.4 Travel time and travel speed on the Bridge Street / Wilberforce Road

4.4.1 Travel time analysis

A Travel time survey was completed for a 1.5 kilometre route along the Bridge Street / Wilberforce Road.

Table 4-9 shows the recorded peak period travel times on Bridge Street / Wilberforce Road for March 2017 and August 2019.

Table 4-8 Average travel times on Bridge Street / Wilberforce Road in 2017 and 2019

Period	Direction	Average Travel Time		
		2017	2019	Change
7-9 AM	Northbound	2.3 minutes	2.1 minutes	-0.2 minutes (-12 seconds) ▼
	Southbound	3.7 minutes	3.7 minutes	0.0 minutes (0 seconds) ▶
4-6 PM	Northbound	3.3 minutes	2.6 minutes	-0.7 minutes (-42 seconds) ▼
	Southbound	2.2 minutes	2.1 minutes	-0.1 minutes (-6 seconds) ▼

Note: Travel time route - Bridge Street / Wilberforce Road (between 500 metres south of Court Street / Bridge Street intersection and 500 metres east of Freemans Road / Wilberforce Road intersection).

The travel time analysis indicates that:

- During the AM peak period, the average travel time in 2019 decreased by 12 seconds in the northbound direction, with no change in travel time in the southbound direction when compared to 2017
- During the PM peak period, the average travel time in 2019 decreased by 42 seconds in the northbound direction and about 6 seconds in the southbound direction compared to 2017
- The minor improvements in travel time along the Bridge Street / Wilberforce Road route supports the findings of the traffic volume analysis.

The travel times along the Bridge Street / Wilberforce Road route were further analysed by sections along the surveyed section, with Figures 4-2 to 4-5 detailing the AM and PM peak period results for each direction.

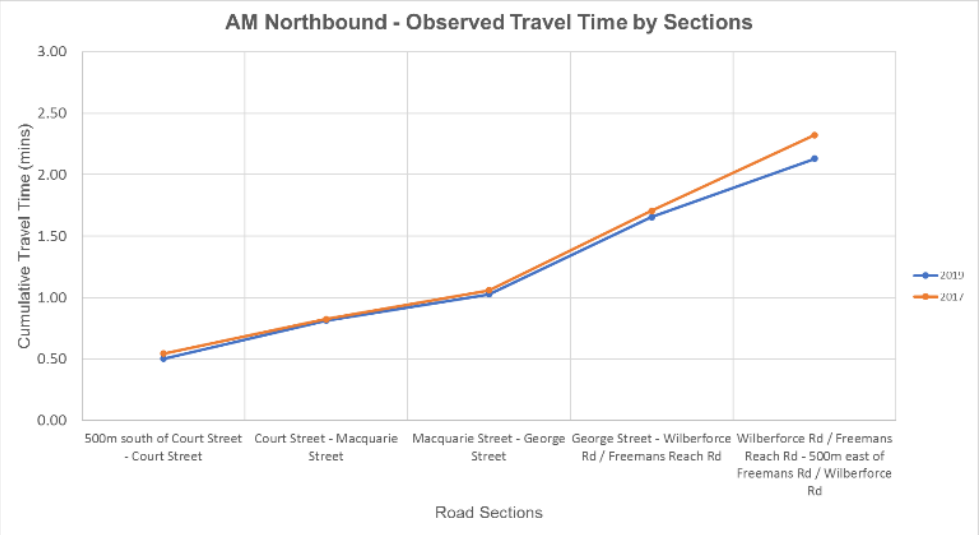

Figure 4-2 Travel time on Bridge Street / Wilberforce Road – AM Northbound

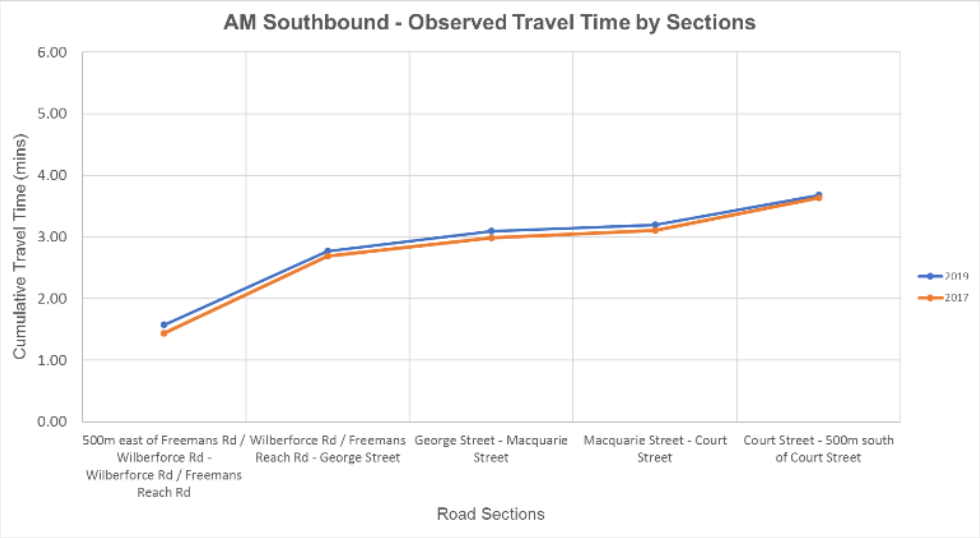

Figure 4-3 Travel time on Bridge Street / Wilberforce Road – AM Southbound

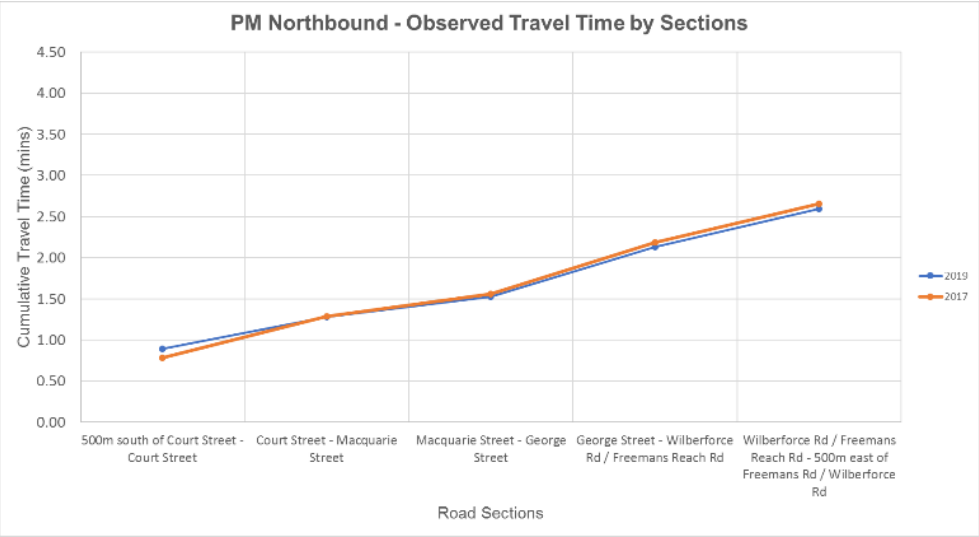

Figure 4-4 Travel time on Bridge Street / Wilberforce Road – PM Northbound

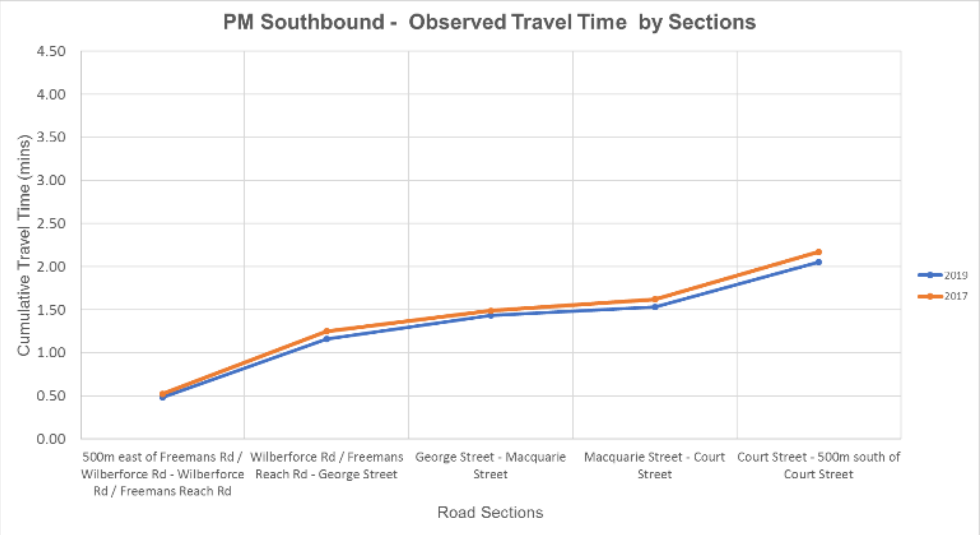

Figure 4-5 Travel time on Bridge Street / Wilberforce Road – PM Southbound

4.4.2 Travel speed analysis

A travel speed analysis was also completed along the Bridge Street / Wilberforce Road route for March 2017 and August 2019.

Table 4-10 shows the average travel speed along the Bridge Street / Wilberforce Road route during the AM and PM peak periods.

Table 4-9 Average travel speed on Bridge Street / Wilberforce Road in 2017 and 2019

Average Travel Speed (km/h)	Survey Year		Change
	2017	2019	
AM Peak Period (7-9 AM)			
Northbound	39 km/h	40 km/h	1 km/h ▲
Southbound	20 km/h	21 km/h	1 km/h ▲
PM Peak Period (4-6 PM)			
Northbound	41 km/h	42 km/h	1 km/h ▲
Southbound	35 km/h	37 km/h	2 km/h ▲

The travel speed analysis indicates that:

- In the 2019 AM peak period, the average travel speed along the Bridge Street / Wilberforce Road route increased by one kilometre per hour in the northbound and southbound directions when compared to 2017
- In the 2019 PM peak period, the average travel speed has increased by one kilometre per hour in the northbound direction and two kilometres per hour in the southbound direction compared to 2017
- The findings suggest there has been a minor improvement to the overall travel speeds across the AM and PM peak periods between 2017 and 2019.

4.5 Intersection queue length

The queue lengths were observed during the AM and PM peak periods for one weekday in March 2017 and August 2019 at the following intersections:

- Wilberforce Road / Freemans Reach Road
- Bridge Street / George Street
- Bridge Street / Macquarie Street
- Bridge Street / Court Street.

Figure 4-6 and Figure 4-7 provides the 2017 and 2019 queues (95th percentile) across the four locations for the AM peak hour (8am to 9am) and PM peak hour (4pm to 5pm) respectively.

Figure 4-6 Observed queues – AM Peak

Figure 4-7 Observed queues – PM Peak

The queue lengths across the four locations in 2017 and 2019 are similar, with minor changes observed across the study area.

5 Summary and Conclusions

This technical advice memo has been prepared to document traffic changes on Windsor Bridge and four nearby intersections between 2017 and 2019.

The 2017 and 2019 traffic data has been compared across the following factors:

1. Daily traffic volumes on the Windsor Bridge
2. Daily Heavy vehicles proportions on the Windsor Bridge
3. Morning (AM) and afternoon (PM) peak hour traffic volumes on the Windsor Bridge
4. Peak hour traffic volumes at four intersections on Bridge Street / Wilberforce Road with Freemans Reach Road, George Street, Macquarie Street and Court Street
5. Peak hour travel time and travel speed on the section of Bridge Street / Wilberforce Road between Court Street and Freemans Road
6. Peak hour queue lengths on intersection approach roads at four locations including Bridge Street / Wilberforce Road intersections with Freemans Reach Road, George Street, Macquarie Street and Court Street.

The following conclusions are made:

- Across the two time periods, traffic on Windsor Bridge has increased by 100 vehicles (0.5 per cent) per weekday. This suggests that the overall traffic volumes have remained relatively consistent between 2017 and 2019
- The peak hour traffic volume change across the four intersections is minor, with a 2 per cent increase observed between 2017 and 2019
- In the 2019 AM and PM peak period, average travel times on the Bridge Street / Wilberforce Road have marginally decreased by between six to 42 seconds when compared to 2017
- The survey results suggest there has been a minor improvement to the overall travel speeds across the AM and PM peak periods between 2017 and 2019
- The queue lengths across the four locations in 2017 and 2019 are similar, with minor changes observed across the study area.

Overall, the traffic volumes on the Windsor Bridge and the four nearby intersections have remained at similar levels between 2017 and 2019.