Barangaroo Concept Plan Modification

Transport Assessment

Prepared for:

Infrastructure NSW

9 July 2020

JMT Consulting

Document History

Document Title	Revision	Date issued	Author
Mod 11 transport assessment	Draft	03/07/20	JM
Mod 11 transport assessment	Final	09/07/20	JM

JMT Consulting

J Milston Transport Consulting Pty Ltd

ABN: 32635830054
ACN: 635830054
23 Leonard Avenue
Kingsford NSW 2032
Australia

Table of Contents

Figures

Tables

1 Introduction

1.1 Background

This report supports a Section 75W Modification to Concept Plan Approval MP06_0162 (known as Modification 11) pursuant to clause 3C, Schedule 2 of *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (Savings and Transitional Regulation).

1.2 Overview of proposed modification

This Modification (Modification 11) seeks approval to:

- expressly permit construction vehicles and non-construction vehicles to use Barton Street; and
- stage the delivery of Hickson Park to align with the current status of the development of the surrounding buildings in Barangaroo South and Central Barangaroo, and to avoid the potential for abortive and reinstatement works.

1.3 Report purpose

This report has been prepared by JMT Consulting on behalf of Infrastructure NSW. It considers the traffic and transport implications of the proposed modification to the concept plan, focusing specifically on the utilisation of Barton Street as a temporary public road. This assessment considers the following items associated with the potential use of Barton Street as a temporary public road:

- Traffic circulation arrangements
- Future traffic flows and road network operation
- Arrangements for taxis / ride-share vehicles
- Construction traffic arrangements
- Pedestrian movements and safety issues in the Barangaroo South precinct
- Barton Street configuration, including measures to maintain good levels of pedestrian safety and connectivity
- Implications for public transport users
- Road user safety

2 Context

2.1 Background to Barton Street

A new east west street connecting Hickson Road with Barangaroo Avenue, following the alignment of Gas Lane, has been a key component of various iterations of the Barangaroo Concept Plan (including the original Concept Plan developed in 2007).

As part of a condition of approval for Modification 8 of the Concept Plan, Barton Street was to be used as a temporary construction road so that so that it could be returned to parkland following completion of the development on Block Y and the construction of Barangaroo Avenue with Central Barangaroo.

2.2 Current status

The temporary construction road is 'development without consent' under clause 94 of the State Environmental Planning Policy (Infrastructure) 2007 and has been the subject of a Part 5 Review of Environmental Factors (REF) which was determined by INSW in June 2020. Construction of Barton Street has recently commenced to facilitate access for construction vehicles.

The timing for the reinstatement of Barton Street to parkland within Hickson Park has been agreed with the Secretary of the DPIE in accordance with Condition B3(5), to allow Barton Street to remain in place until Barangaroo Avenue through Central is complete and operational.

INSW is now seeking to modify the Concept Plan to expressly permit both construction and non-construction vehicles to use Barton Street. Its operation as a temporary public road for all vehicles will ease pressure on the road network while development in Barangaroo South and Central Barangaroo is occurring. No changes are proposed to the road design or configuration.

2.3 Previous transport assessments

In 2015 a Transport Management and Accessibility Plan (TMAP) was developed for the Barangaroo South precinct to support Modification 8 of the concept plan. This TMAP detailed the future traffic and transport environment within Barangaroo South, including the appropriateness of the proposed vehicle access and circulation routes.

While findings supporting the TMAP remain valid, there are however interim site condition changes since the preparation of the document, those being:

(i) The TMAP assumed that the One Sydney Harbour (OSH) development would be completed at approximately the same time as the Crown Sydney Hotel Resort (CSHR). There has since been delays to the program of the OSH development which will result in construction works continuing following the opening of the CSHR towards the end of 2020. This change in program has several implications for the operation of the transport network, including:

- An effect on the timing for the implementation of traffic lights at the Hickson Road / Watermans Quay intersection immediately adjacent to the R5 Building impacting the capacity for vehicles to efficiently arrive to and depart from the Barangaroo precinct; and
- The requirement for construction vehicles entering and exiting the OSH development to interact with general traffic in the Barangaroo precinct, including those travelling to/from the CSHR; and

(ii) The extension of Barangaroo Avenue through Central Barangaroo, as envisaged in the concept plan, has been delayed and is still some years away from being completed. The consequence of this programming change would be that, for a period, all traffic accessing the CSHR would be reliant on using either Watermans Quay or Barangaroo Avenue only.

Since the development of the TMAP in 2015 there has also been a significant take up of ride-share as a mode of transport, particularly with the growth of ride-sharing apps such as Uber. When the TMAP was prepared ride-sharing apps were in their infancy and the precinct was planned and designed based on the level of taxi / ride-share usage at the time.

Barton Street therefore provides opportunity to manage the transport implications of site condition changes and growth of ride-share vehicles that has occurred since the development of the TMAP in 2015 - prior to the completion of a permanent road connection through Central Barangaroo. This will ensure a good level of pedestrian and traffic circulation is maintained through the Barangaroo precinct, in line with the objectives of the TMAP.

Barton Street is expected to remain in place until the final road network for Central Barangaroo is determined. From this point it will no longer be required as a temporary public road and can be returned to parkland.

2.4 Barton Street location

The location of Barton Street in the context of the Barangaroo precinct is illustrated in Figure 1 below.

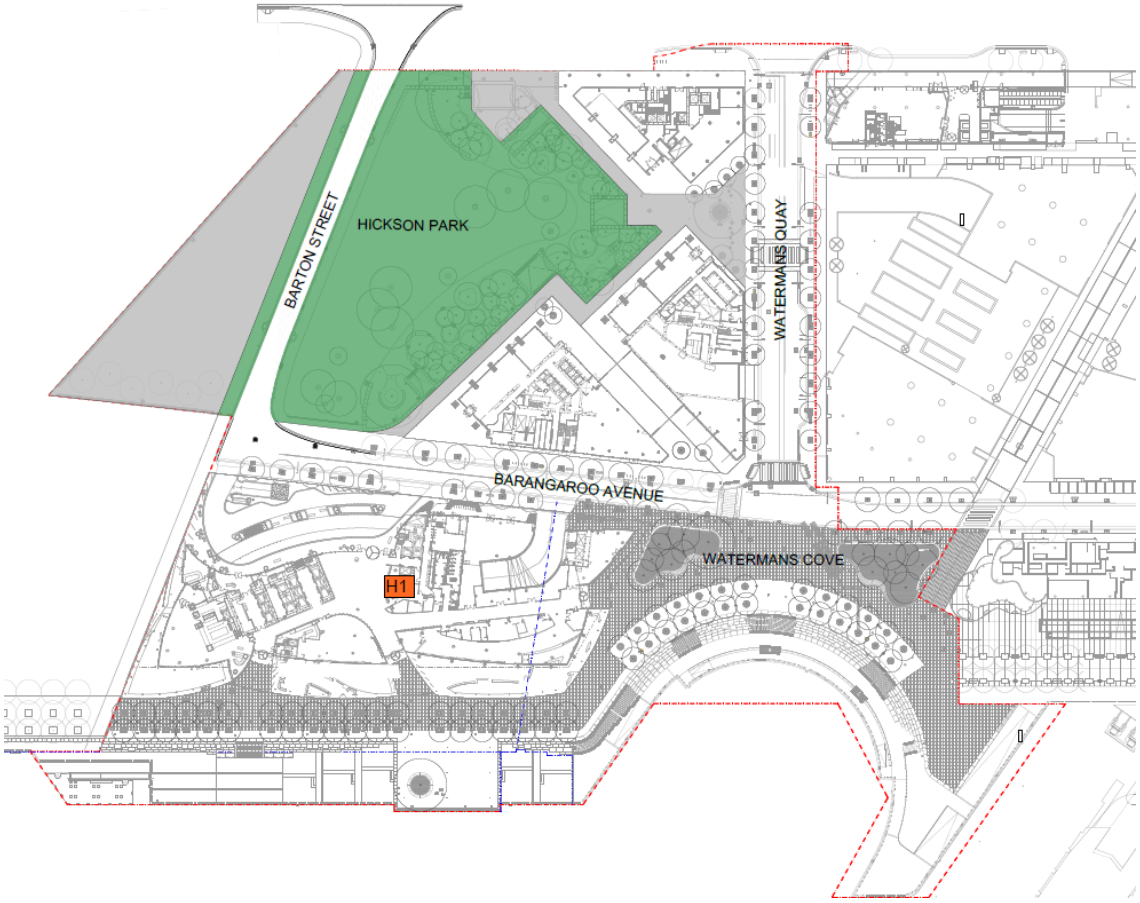

Figure 1 Barton Street location

Source: Grant Associates (2020)

3 Barton Street Configuration

Barton Street is designed as a two-way street with a traffic lane in each direction, providing access between Barangaroo Avenue and Hickson Road. Access to Barton Street from Hickson Road would be via a priority control intersection, with both left and right hand turn movements permitted. Similarly, all traffic movements would be permitted at the intersection with Barangaroo Avenue, however no access would be provided to the north of Barton Street prior to the completion of Barangaroo Avenue and opening of Central Barangaroo. These arrangements are shown in Figure 2.

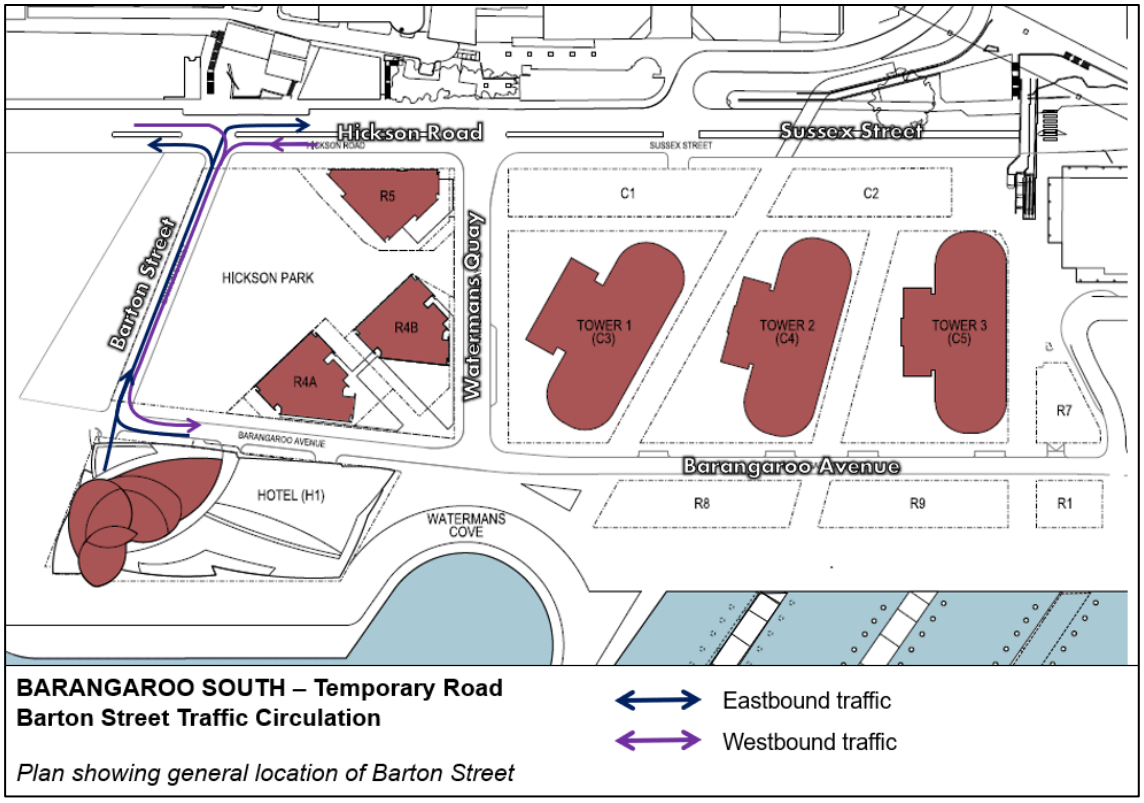

Figure 2 Barton Street circulation arrangements

Traffic lanes would be 3.5m wide which is a sufficient width to accommodate expected vehicle types. Two dedicated zebra crossings would be provided that aligns with pedestrian desire lines and to maintain pedestrian safety and movement. The street would be signposted at 40km/h and would be designed in manner to encourage traffic to travel at low speeds.

4 Transport Assessment

The following sections of this document consider the traffic and transport implications of the temporary use of Barton Street prior to the completion of Central Barangaroo and Barangaroo Avenue - in response to the site condition changes as outlined in comments of Section 2 in this report.

It should be noted that the Concept Plan modification does not propose to alter the approved quantum of floor space within the Barangaroo precinct, and therefore the overall travel demand will remain unchanged when compared with that previously considered as part of the TMAP Mod 8.

4.1 Traffic circulation arrangements

Following the expected opening of the CSHR in late 2020, all traffic entering and exiting the Barangaroo precinct will be required to use either Watermans Quay or Barangaroo Avenue. Without the completion of Barangaroo Avenue to the north (as a part of Central Barangaroo) all traffic will be required to turn around and travel southbound to the Watermans Quay / Barangaroo Avenue intersection to depart the precinct.

The use of Barton Street as a temporary road for all vehicles would act as a ‘relief-valve’ for traffic in the precinct by providing another opportunity for vehicles to access Hickson Road via Barangaroo Avenue. Instead of all traffic converging at the Watermans Quay / Barangaroo Avenue intersection, vehicles can instead bypass Watermans Quay and utilise Barton Street to access Hickson Road.

Vehicles leaving the CSHR porte-cochere can travel straight through onto Barton Street, rather than turning right across traffic and travelling southbound to the Hickson Road / Watermans Quay intersection. This will not exclude vehicles turning right from the porte-cochere and travelling southbound on Barangaroo Avenue.

The result of this additional connection to Hickson Road will be reduced congestion in the precinct, given the traffic load would be distributed across two east-west connections rather than solely relying only on Watermans Quay. This distribution of traffic across two roads will be also be beneficial as an interim solution prior to the completion of Watermans Quay and the associated delivery of traffic signals at the Watermans Quay / Hickson Road intersection.

These arrangements are shown illustratively in Figure 3 and Figure 4 on the following page.

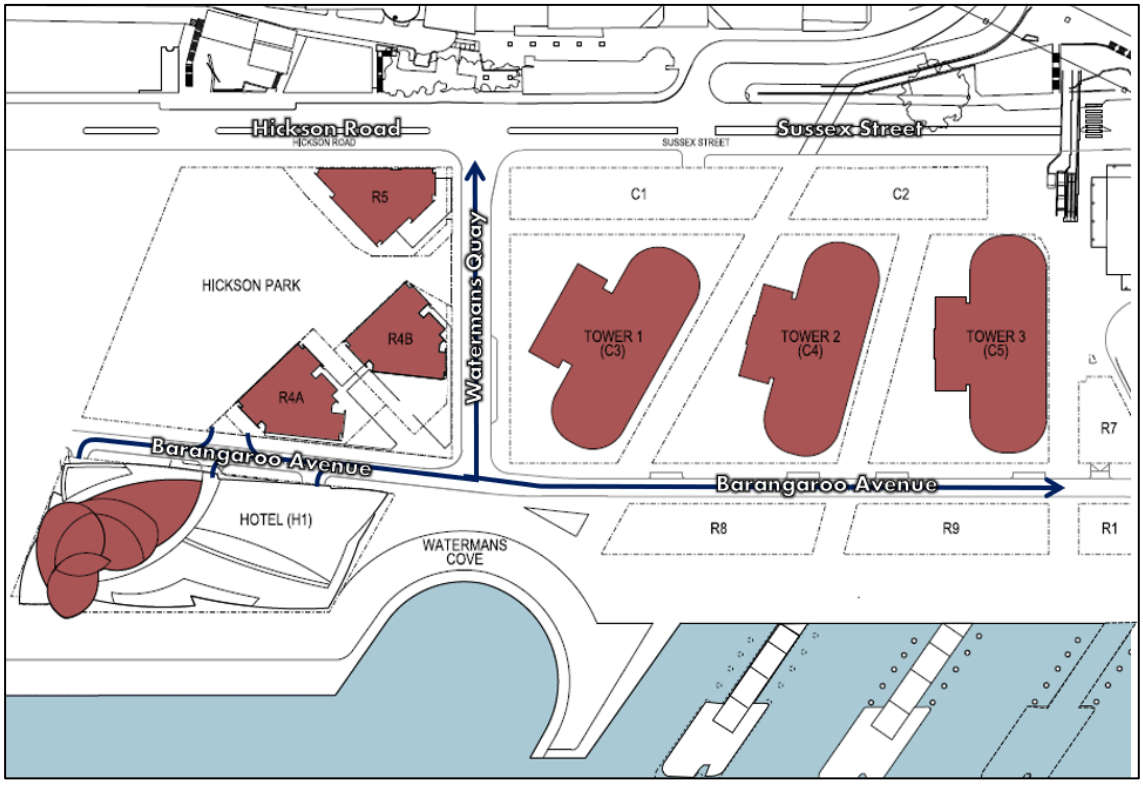

Figure 3 Traffic circulation arrangements – without Barton Street

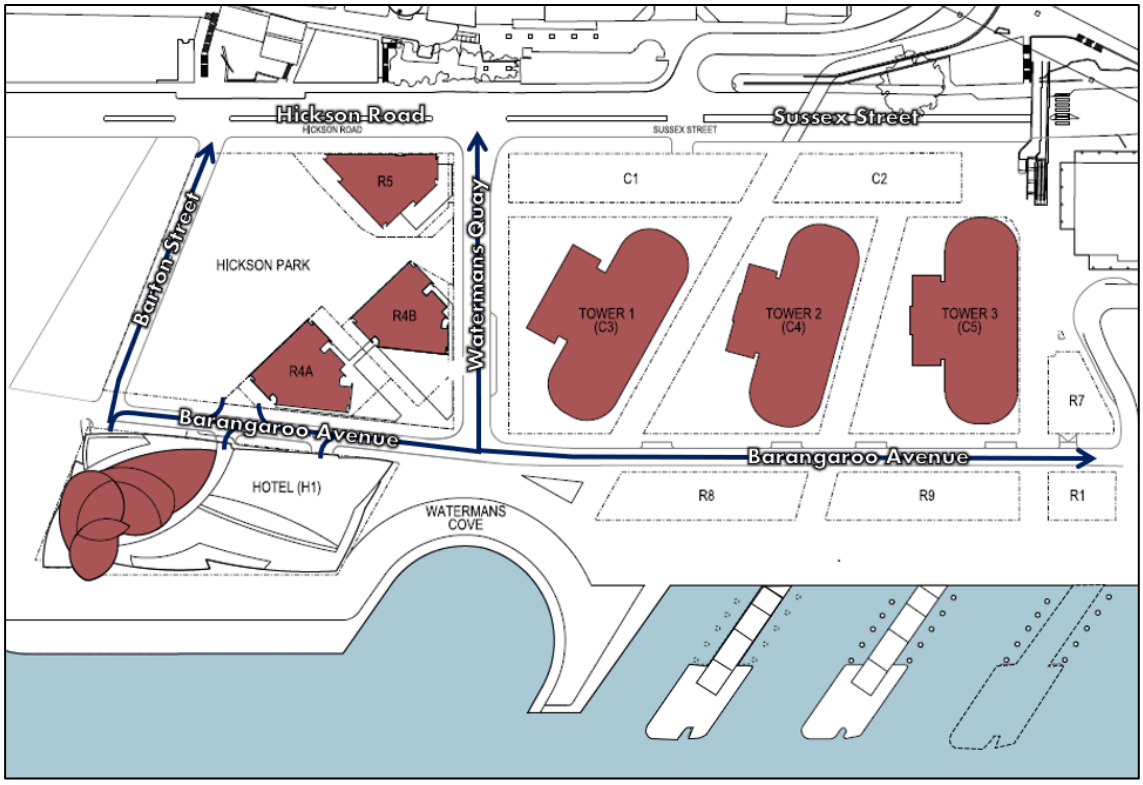

Figure 4 Traffic circulation arrangements – with Barton Street

4.2 Forecast traffic movements

As noted in Section 4.1, the use of Barton Street as a temporary road for all vehicles would distribute the traffic load across the Barangaroo South precinct and reduce traffic movements on Watermans Quay and Barangaroo Avenue (south of Watermans Quay).

Analysis has been undertaken to determine the extent to which traffic flows change as a result of the introduction of Barton Street as a temporary public road. The analysis has considered forecast traffic movements on a typical Friday between 6pm-7pm as well as 10pm-11pm. This evening peak was previously identified in the TMAP Mod 8 as the busiest period of the day for vehicles entering and exiting the CSHR. The 6pm-7pm time period coincides with the peak arrival period for people entering Barangaroo South and the CSHR for evening dining, while 10pm-11pm corresponds with the peak departure period. It should be noted that this evening peak does not coincide with construction vehicle activity on the site, which finishes at 7pm on a weekday.

The analysis has considered the following:

- Existing traffic flows in the Barangaroo South precinct (based on surveys undertaken in October 2019);
- Future traffic flows associated with the Crown Sydney Hotel Resort[1]; and
- Future traffic flows associated with the Barangaroo One Sydney Harbour development.[2]

The forecast levels of traffic, with and without Barton Street in place as a temporary public road, are presented in Figure 5 and Figure 6 on the following page.

[1] As documented in the 'Crown Sydney Hotel Resort Transport Assessment' (Arup, July 2015)
[2] As documented in the 'One Sydney Harbour Transport and Management Accessibility Plan (Arup, July 2016)

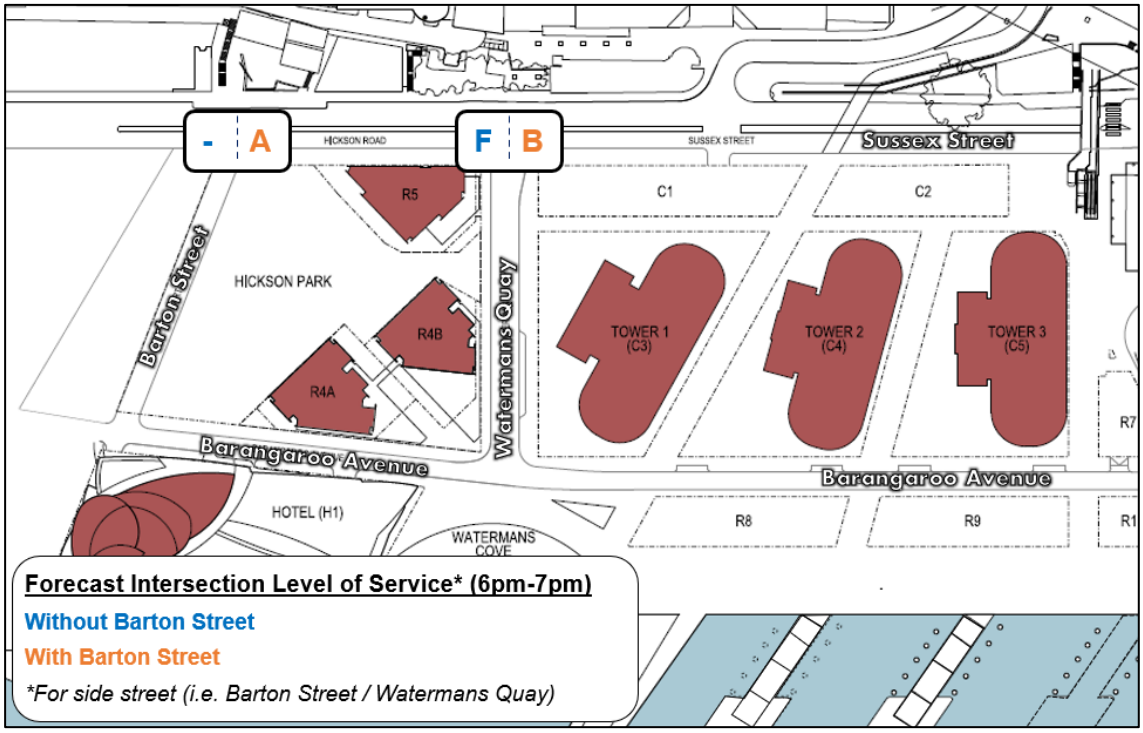

Figure 5 Forecast traffic flows – Friday 6pm to 7pm

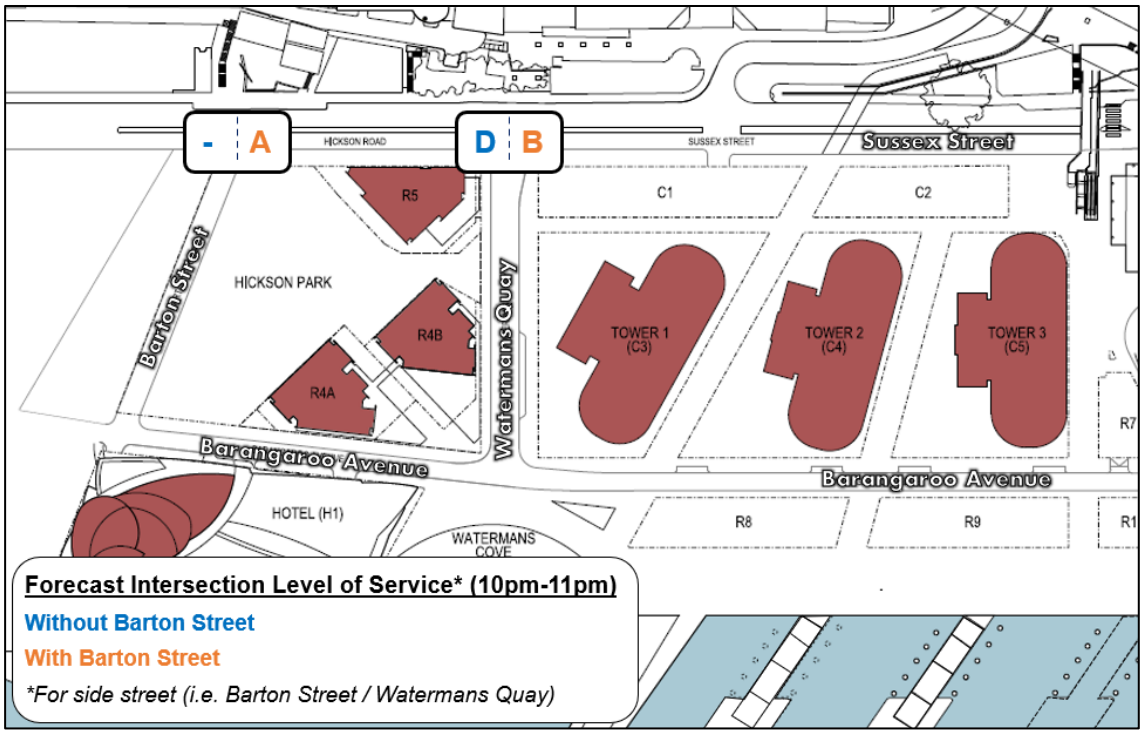

Figure 6 Forecast traffic flows – Friday 10pm to 11pm

The analysis forecasts that Watermans Quay would experience a significant reduction in traffic movements of between 35% (6pm-7pm) to 60% (10pm-11pm) through the introduction of Barton Street. This is a direct result of CSHR traffic utilising this link as the primary egress route (and also to a lesser extent arrival route) to the site, rather than travelling through the Watermans Quay / Barangaroo Avenue intersection. The decrease in traffic is more pronounced between 10pm-11pm as this coincides with the peak vehicle departure period, compared to 6pm-7pm where more vehicles arrive to the site.

Traffic movements on Barangaroo Avenue (south of Watermans Quay) are forecast to reduce by up to 20 vehicles per hour with Barton Street in place.

4.3 Road network operation

Traffic modelling at the Watermans Quay / Hickson Road intersection and the Barton Street / Hickson Road intersection has been undertaken to understand the future operation of the road network. Analysis was undertaken for both 6pm-7pm which is the busiest hour of the day, as well as for the later 10pm-11pm peak where up to 200 vehicles per hour are expected to turn out of Barton Street onto Hickson Road. The modelling has taken into consideration the timing of the future traffic lights at the Hickson Road / Watermans Quay intersection – and therefore has adopted the current priority control configuration of this intersection.

The assessment has considered the level of service of the internal roads within the Barangaroo precinct – those being Watermans Quay and Barton Street. Level of Service provides an indication of the average delay drivers could expect at an intersection and ranges from A (very good) to F (over capacity with significant delays).

The modelling demonstrates that the road network operates in a significantly improved manner with the introduction of Barton Street as a temporary public road. Without Barton Street in place the Hickson Road / Watermans Quay intersection would operate at Level of Service F during the 6pm-7pm period following the opening of the CSHR in late 2020. With Barton Street available for use as a temporary road, the intersection Level of Service improves to ‘B’ (acceptable with spare capacity).

The Hickson Road / Barton Street intersection is forecast to operate well at Level of Service A, with the maximum queue forecast on Barton Street to be approximately 15m in length. Therefore, the intersection layout is considered suitable to accommodate future traffic flows on Barton Street.

The modelling results are illustrated in Figure 7 and Figure 8 on the following page, with detailed outputs provided as Appendix A of this document.

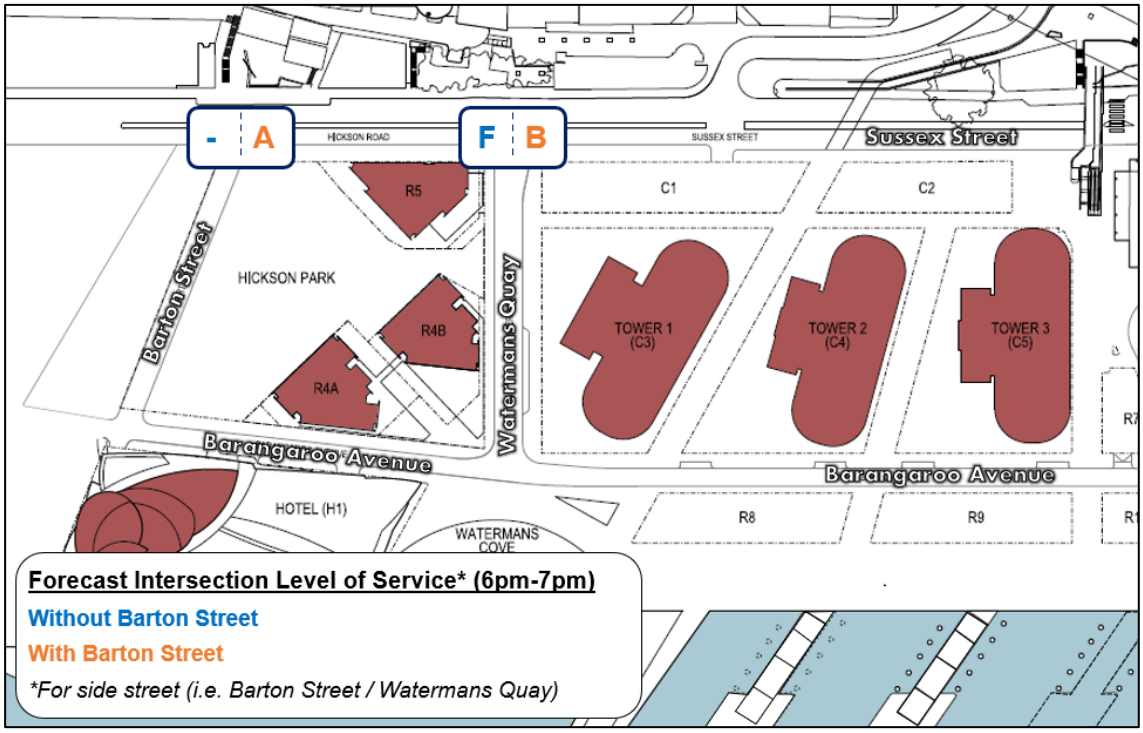

Figure 7 Forecast intersection performance – Friday 6pm to 7pm

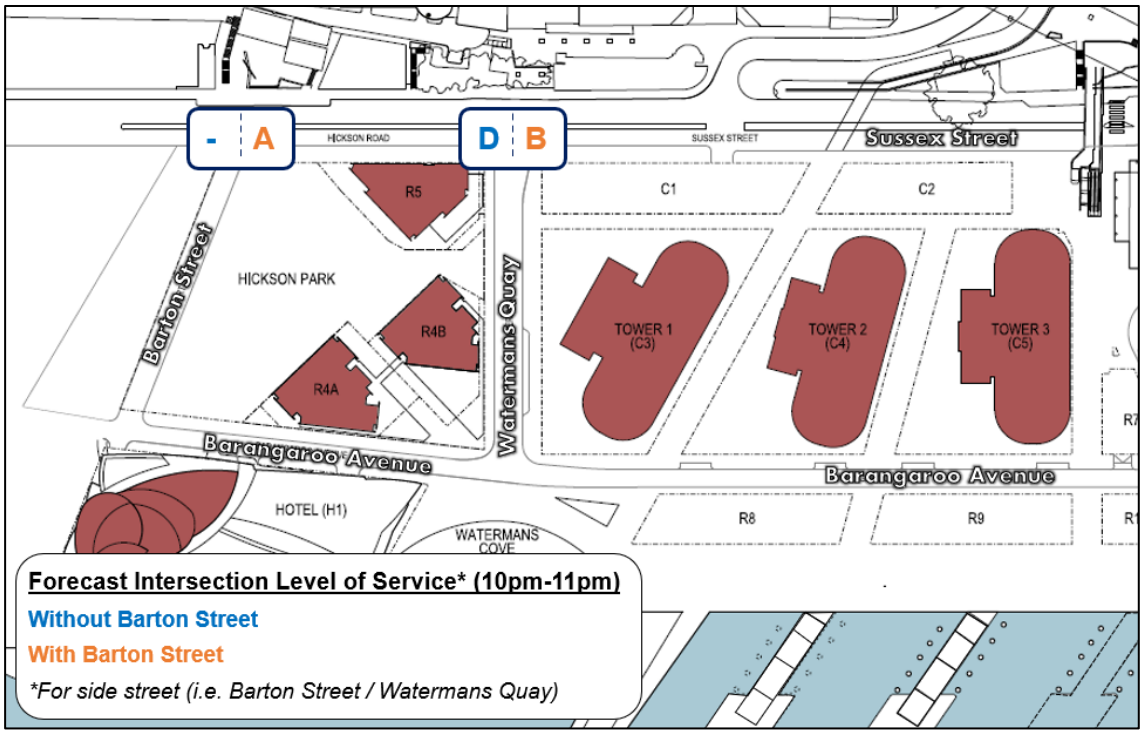

Figure 8 Forecast intersection performance – Friday 10pm to 11pm

4.4 Taxis and ride-share vehicles

Taxis and ride-sharing vehicles (e.g. Uber, Lyft) currently make up a significant proportion of total car trips in Barangaroo South. Observations of current road operations in the precinct indicate that at times the high demands generated by taxis and ride-share vehicles can result in congestion on internal roads.

To understand the current level of taxi and ride-share usage in Barangaroo South, a survey was undertaken of the four taxi ranks in the precinct over a Friday evening in October 2019. The survey was conducted between 5pm and 1am and recorded the demand for the taxi ranks by both taxis and ride-share vehicles. Nearly 250 vehicle movements per hour (i.e. in and out) were recorded in the survey, with the peak period occurring between 6pm-7pm. A second peak period between 10pm-11pm was also recorded in the surveys with nearly 200 vehicle movements in the internal streets. The results of the survey indicating hourly vehicle movements is illustrated in Figure 9.

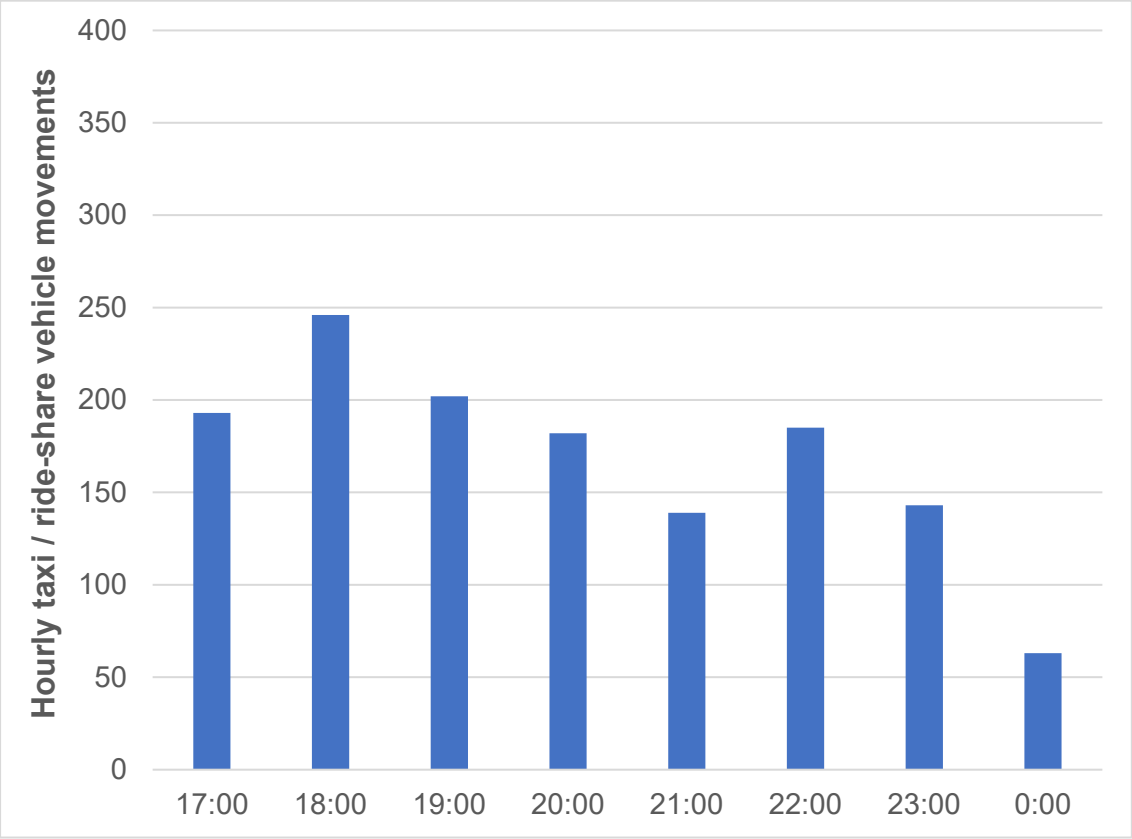

Figure 9 Existing taxi / ride-share demand in Barangaroo South

The opening of the CSHR in late 2020 will result in additional taxi and ride-share movements to the Barangaroo Precinct, particularly later in the evening as people arrive / depart the site. Previous analysis indicated close to 100 traffic movements per hour associated with this vehicle type, increasing total activity by close to 40% over a typical Friday evening period. This projected increase in activity is shown in Figure 10 below.

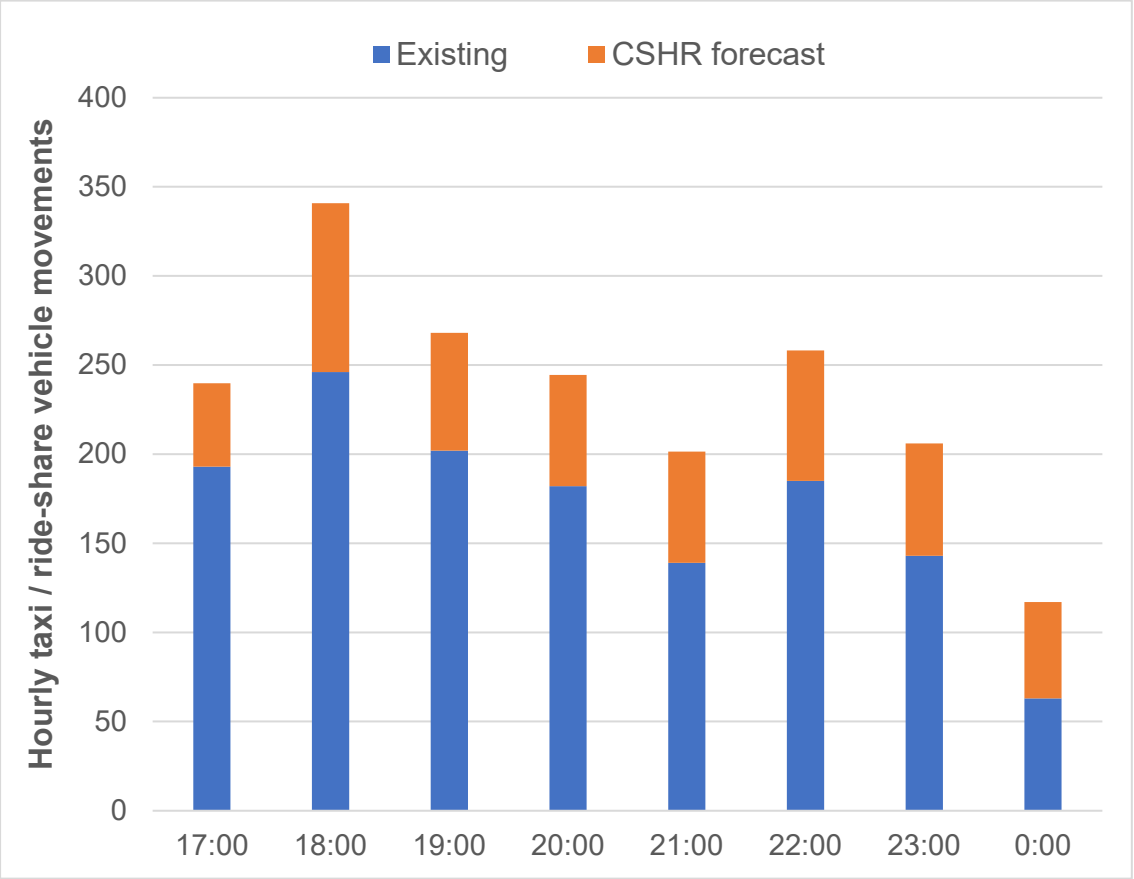

Figure 10 Forecast taxi / ride-share demand in Barangaroo South

The use of Barton Street as a temporary public road provides an opportunity to maintain a good level of operations for taxis and ride-share vehicles in Barangaroo South, prior to the completion of Barangaroo Avenue within Central Barangaroo. It would contribute to relieving capacity on Barangaroo Avenue and Watermans Quay by providing vehicles with an alternative circulation route to Hickson Road.

4.5 Construction traffic arrangements

As previously noted, a Review of Environmental Factors (REF) was determined by INSW in June 2020 to permit Barton Street as a temporary construction road, consistent with a condition of approval for Modification 8 of the Barangaroo Concept Plan.

From late 2020, there will be a period of time where construction vehicles associated with the One Sydney Harbour development will need to utilise Barangaroo Avenue (north of Watermans Quay) at the same time as general traffic associated with the CSHR. A loading bay / works zone is proposed on the eastern side of Barangaroo Avenue so that One Sydney Harbour construction vehicles do not impact general traffic movements. The loading bay will be contained within the construction site, with vehicles accessing the bay by travelling southbound on Barangaroo Avenue.

The proposal for Barton Street to operate as a temporary road for all vehicles would also improve traffic conditions for construction vehicles by reducing the overall volume of traffic using Watermans Quay.

There are not expected to be impacts to general traffic using Barton Street due to the presence of construction vehicles, given the relatively low number of construction vehicles and the peak traffic flows on Barton Street (largely associated with the CSHR) are not forecast to coincide with construction vehicle activity on the site.

4.6 Pedestrian circulation

As part of the delivery of Barton Street as a temporary construction road, footpaths are to be provided on both sides of the street which will connect Hickson Road with Barangaroo Avenue. These footpaths are to be 3.45m wide on the southern side and 4.0m wide on the northern side of Barton Street, providing sufficient space to accommodate pedestrian movements. These footpaths would be retained as part of the proposal to convert Barton Street to a temporary road for all vehicles.

As previously noted, Barton Street is to be signposted at 40km/h and would be designed in manner to encourage traffic to travel at low speeds. To improve pedestrian connectivity, two north-south zebra crossings are to be provided along Barton Street in order to facilitate safe crossing movements. A pedestrian crossing of Hickson Road, aligning the footpath on the northern side of Barton Street, is also approved as part of the works covered under the REF to enhance pedestrian movements.

Barton Street would also provide the opportunity to deliver a continuous footpath connection from Hickson Road to align with a future public access path to the foreshore. This would significantly enhance pedestrian connectivity between Hickson Road, Hickson Park and the foreshore. It is noted that the footpath from Hickson Road to the western side of Barangaroo Avenue is to be delivered under the recently approved REF. The section of footpath from the western side of Barangaroo Avenue to the foreshore would be subject to separate planning.

Pedestrian circulation arrangements with Barton Street in place is illustrated in Figure 11 below.

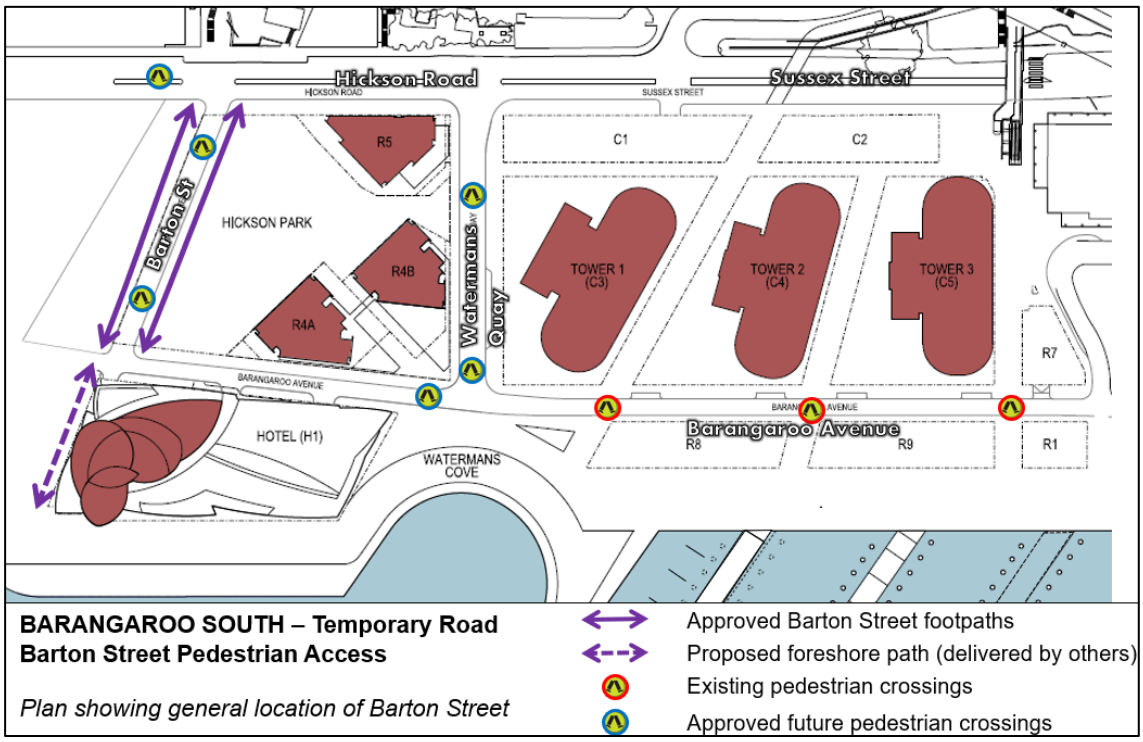

Figure 11 Pedestrian circulation arrangements

4.7 Public transport

The proposed modification is not expected to impact the three existing bus routes that utilise Hickson Road, those being the 311, 324 and 325. Traffic flow and efficiency on Hickson Road is likely to remain unchanged from current conditions with Barton Street in place.

4.8 Road user safety

The safety of road users (including public transport users) should improve with Barton Street in place as a temporary public road, given drivers departing the Barangaroo precinct will have reduced delays which will in turn lower the likelihood of taking unnecessary risks when turning out of Watermans Quay onto Hickson Road.

5 Summary

This report considers the traffic and transport implications of utilising Barton Street as a temporary road for all vehicles. Table 1 below provides a summary of these implications which demonstrates an overall benefit to the transport network if Barton Street were to be used as a temporary public road, prior to the opening of Central Barangaroo.

Table 1 Transport implications of the use of Barton Street as a temporary public road

Item	Implications of the use of Barton Street as a temporary road for all vehicles	Implications for the transport network
Traffic circulation	• Barton Street would act as a 'relief-valve' for traffic by providing another opportunity for vehicles to access Hickson Road via Barangaroo Avenue • Instead of all traffic converging at the Watermans Quay / Barangaroo Avenue intersection, vehicles can instead bypass Watermans Quay and utilise Barton Street to access Hickson Road	**Beneficial**
Traffic flows / road network operation	• The use of Barton Street would distribute the traffic load across the Barangaroo South precinct and reduce traffic flows on Watermans Quay and Barangaroo Avenue • The Hickson Road / Watermans Quay intersection would operate in a significantly improved manner with Barton Street in place as a temporary public road	**Beneficial**
Taxis and ride-share vehicles	• Barton Street provides an opportunity to maintain a good level of operations for taxis and ride-share vehicles in Barangaroo South following the opening of the CSHR in late 2020	**Beneficial**
Construction traffic arrangements	• Barton Street is already approved for as a temporary construction road and would provide further benefits to construction vehicles when operating as a temporary road for all vehicles by reducing the overall volume of traffic using Watermans Quay	**Beneficial**
Pedestrian circulation	• Pedestrian footpaths and zebra crossings are to be provided on Barton Street as part of the approved REF works and would be retained as part of the proposal	**Neutral**
Public transport	• No changes to public transport operations are anticipated	**Neutral**
Road user safety	• The safety of road users should improve given drivers departing the precinct will have reduced delays which will in turn lower the likelihood of taking unnecessary risks when turning out of Watermans Quay onto Hickson Road.	**Beneficial**

Appendix A: Traffic Modelling Outputs

MOVEMENT SUMMARY

Site: 101 [Hickson Road - Watermans Quay (Site Folder: 6pm-7pm + CSHR (no Barton Street))]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hickson Road (S)														
1	L2	336	0.0	354	0.0	0.190	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	330	0.0	347	0.0	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		666	0.0	701	0.0	0.190	2.8	NA	0.0	0.0	0.00	0.29	0.00	56.5
North: Hickson Road (N)														
8	T1	275	0.0	289	0.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	62	0.0	65	0.0	0.097	9.4	LOS A	0.4	2.5	0.58	0.80	0.58	50.3
Approach		337	0.0	355	0.0	0.149	1.8	NA	0.4	2.5	0.11	0.15	0.11	57.9
West: Watermans Quay (W)														
10	L2	112	0.0	118	0.0	0.994	66.4	LOS E	19.5	136.6	0.91	2.30	5.06	26.5
12	R2	210	0.0	221	0.0	0.994	82.8	LOS F	19.5	136.6	0.91	2.30	5.06	26.4
Approach		322	0.0	339	0.0	0.994	77.1	LOS F	19.5	136.6	0.91	2.30	5.06	26.5
All Vehicles		1325	0.0	1395	0.0	0.994	20.6	NA	19.5	136.6	0.25	0.74	1.26	44.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hickson Road - Watermans Quay (Site Folder: 10pm-11pm + CSHR (no Barton Street))]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hickson Road (S)														
1	L2	218	0.0	229	0.0	0.124	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	140	0.0	147	0.0	0.076	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		358	0.0	377	0.0	0.124	3.4	NA	0.0	0.0	0.00	0.35	0.00	55.9
North: Hickson Road (N)														
8	T1	280	0.0	295	0.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	42	0.0	44	0.0	0.045	7.1	LOS A	0.2	1.2	0.42	0.64	0.42	51.9
Approach		322	0.0	339	0.0	0.152	1.0	NA	0.2	1.2	0.06	0.08	0.06	58.7
West: Watermans Quay (W)														
10	L2	95	0.0	100	0.0	0.936	35.4	LOS C	18.6	130.3	0.78	1.80	3.39	34.8
12	R2	332	0.0	349	0.0	0.936	46.2	LOS D	18.6	130.3	0.78	1.80	3.39	34.7
Approach		427	0.0	449	0.0	0.936	43.8	LOS D	18.6	130.3	0.78	1.80	3.39	34.8
All Vehicles		1107	0.0	1165	0.0	0.936	18.3	NA	18.6	130.3	0.32	0.83	1.33	45.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hickson Road - Watermans Quay (Site Folder: 6pm-7pm + CSHR (with Barton Street))]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hickson Road (S)														
1	L2	222	0.0	234	0.0	0.126	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	444	0.0	467	0.0	0.240	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		666	0.0	701	0.0	0.240	1.9	NA	0.0	0.0	0.00	0.19	0.00	57.6
North: Hickson Road (N)														
8	T1	275	0.0	289	0.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	20	0.0	21	0.0	0.032	9.3	LOS A	0.1	0.8	0.57	0.74	0.57	50.3
Approach		295	0.0	311	0.0	0.149	0.7	NA	0.1	0.8	0.04	0.05	0.04	59.2
West: Watermans Quay (W)														
10	L2	51	0.0	54	0.0	0.559	16.9	LOS B	3.0	20.7	0.81	1.16	1.35	42.1
12	R2	111	0.0	117	0.0	0.559	30.0	LOS C	3.0	20.7	0.81	1.16	1.35	41.9
Approach		162	0.0	171	0.0	0.559	25.8	LOS B	3.0	20.7	0.81	1.16	1.35	42.0
All Vehicles		1123	0.0	1182	0.0	0.559	5.0	NA	3.0	20.7	0.13	0.29	0.20	55.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hickson Road - Barton Street (Site Folder: 6pm-7pm + CSHR (with Barton Street))]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hickson Road (S)														
1	L2	114	0.0	120	0.0	0.270	5.6	LOS A	0.0	0.0	0.00	0.14	0.00	57.1
2	T1	380	0.0	400	0.0	0.270	0.1	LOS A	0.0	0.0	0.00	0.14	0.00	58.6
Approach		494	0.0	520	0.0	0.270	1.4	NA	0.0	0.0	0.00	0.14	0.00	58.3
North: Hickson Road (S)														
8	T1	295	0.0	311	0.0	0.202	0.6	LOS A	0.5	3.6	0.19	0.08	0.19	58.5
9	R2	42	0.0	44	0.0	0.202	8.0	LOS A	0.5	3.6	0.19	0.08	0.19	56.4
Approach		337	0.0	355	0.0	0.202	1.5	NA	0.5	3.6	0.19	0.08	0.19	58.3
West: Barton Street (W)														
10	L2	61	0.0	64	0.0	0.300	10.7	LOS A	1.2	8.5	0.59	1.01	0.70	48.9
12	R2	99	0.0	104	0.0	0.300	14.9	LOS B	1.2	8.5	0.59	1.01	0.70	48.4
Approach		160	0.0	168	0.0	0.300	13.3	LOS A	1.2	8.5	0.59	1.01	0.70	48.6
All Vehicles		991	0.0	1043	0.0	0.300	3.3	NA	1.2	8.5	0.16	0.26	0.18	56.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hickson Road - Barton Street (Site Folder: 10pm-11pm + CSHR (with Barton Street))]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hickson Road (S)														
1	L2	68	0.0	72	0.0	0.133	5.6	LOS A	0.0	0.0	0.00	0.17	0.00	56.9
2	T1	175	0.0	184	0.0	0.133	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	58.4
Approach		243	0.0	256	0.0	0.133	1.6	NA	0.0	0.0	0.00	0.17	0.00	58.0
North: Hickson Road (S)														
8	T1	295	0.0	311	0.0	0.180	0.1	LOS A	0.2	1.7	0.08	0.05	0.08	59.2
9	R2	27	0.0	28	0.0	0.180	6.4	LOS A	0.2	1.7	0.08	0.05	0.08	57.0
Approach		322	0.0	339	0.0	0.180	0.7	NA	0.2	1.7	0.08	0.05	0.08	59.0
West: Barton Street (W)														
10	L2	57	0.0	60	0.0	0.381	9.6	LOS A	1.9	13.0	0.50	1.01	0.63	49.8
12	R2	200	0.0	211	0.0	0.381	12.3	LOS A	1.9	13.0	0.50	1.01	0.63	49.3
Approach		257	0.0	271	0.0	0.381	11.7	LOS A	1.9	13.0	0.50	1.01	0.63	49.4
All Vehicles		822	0.0	865	0.0	0.381	4.4	NA	1.9	13.0	0.19	0.38	0.23	55.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hickson Road - Watermans Quay (Site Folder: 10pm-11pm + CSHR (with Barton Street))]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hickson Road (S)														
1	L2	150	0.0	158	0.0	0.085	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
2	T1	210	0.0	221	0.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		360	0.0	379	0.0	0.113	2.3	NA	0.0	0.0	0.00	0.24	0.00	57.1
North: Hickson Road (N)														
8	T1	280	0.0	295	0.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	15	0.0	16	0.0	0.016	7.0	LOS A	0.1	0.4	0.42	0.61	0.42	52.0
Approach		295	0.0	311	0.0	0.152	0.4	NA	0.1	0.4	0.02	0.03	0.02	59.5
West: Watermans Quay (W)														
10	L2	38	0.0	40	0.0	0.383	10.7	LOS A	1.9	13.6	0.61	1.03	0.81	47.2
12	R2	133	0.0	140	0.0	0.383	17.5	LOS B	1.9	13.6	0.61	1.03	0.81	47.0
Approach		171	0.0	180	0.0	0.383	16.0	LOS B	1.9	13.6	0.61	1.03	0.81	47.1
All Vehicles		826	0.0	869	0.0	0.383	4.5	NA	1.9	13.6	0.13	0.33	0.18	55.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.