

Subject CCW Museum Traffic Supplement

Date 11 September 2017

Job No/Ref 248177

1 Introduction

This memo provides supplementary traffic assessment in response to comments provided by Planning NSW on the Transport and Accessibility Impact Assessment SSDA 16017.

2 Assessment of Travel Impacts

CCWM will result in the co-location and consolidation of the Macleay Museum, Nicholson Museum and University Art Gallery as well as collections from a number of currently fragmented locations into a new single museum.

Future visitors would likely adopt similar characteristics as the current University Museum visitors. A similar future visitor profile proportion can be expected, shown in Figure 1. A majority of the existing university museum tickets sold relate to school students which generally generate less traffic given that students would arrive by school buses or public transport.

For the remaining 47% of visitors, the majority are expected to use public transport with some private car use.

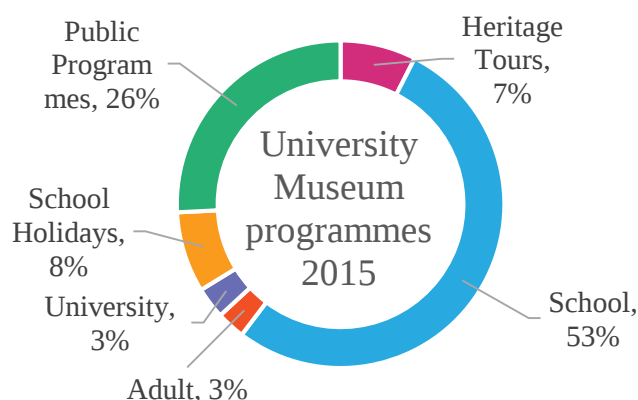


Figure 1: Number of tickets sold relating to each university museum programme 2015

2.1 Patronage increase

As a conservative estimate and for the purpose of this report only, the number of visitors to the CCWM is assumed to increase by 30% of the total number of visitors. Peak monthly data from the year 2015 is used in the assessment.

2.2 Operating hours

The museum will operate on weekdays from 10am to 4:30pm and on alternate Saturdays (subject to change). The weekday operation hours are outside the road commuter peak periods in the AM (8am to 9am) and PM (5pm to 6pm)

2.3 Travel Analysis

Based on a typical museum profile, the number of additional visitors and associated trips are shown in Table 1. Assuming that school related visitors arrive by public transport on train or bus modes, the CCWM would likely generate an additional 40 vehicles per day.

Table 1: Patronage and vehicle increase as a result of the completion of the CCWM

Daily patronage data	Existing university museums visitors	CCWM with a 30% increase in visitors	Number of additional visitors generated by the CCWM
Weekday visitors	1,178	1,531	353
Non-school related visitors (47%)	554	720	166
Daily car users (24% JTW)	132	173	40

In summary, on a typical day it is predicted that the additional museum visitors will use the following modes of travel:

- 187 students using bus, train,
- 126 visitors using bus, train, walk and cycle.
- 40 visitors by car

The daily attendance profile at operating hours is shown in Figure 2. As a conservative estimate, we assume that each visitor arriving by car, drives to the site with no passengers (car occupancy rate of 1.0). This will result in the site generating:

- 40 additional cars per day
- 9 additional cars in the busiest hour, 11am
- 4 additional cars in the morning peak hour
- 2 additional cars in the evening peak hour
- For school bus access, this equates to an additional 3 buses per day, or less if train is used.

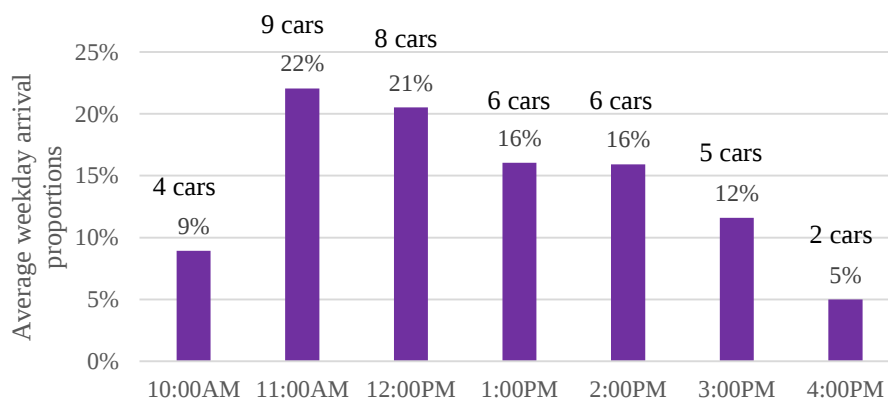


Figure 2: Daily attendance profile by the hour and private vehicle traffic generation by the CCWM

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2.4 Existing traffic

Parramatta Road carries some 40,000 to 50,000 vehicles per day. The hourly profile of traffic on a typical weekday is shown in Figure 3. The road network peak hours typically occur at 7:00am and 5:00pm. During peak visitation hours at 11am, Parramatta Road carries some 2,830 vehicle per hour in both directions. The increase in 9 cars generated from CCWM is equivalent to 0.32% of the existing traffic and is considered to have little or no impact on the road network.

Parramatta Road (19065) Data

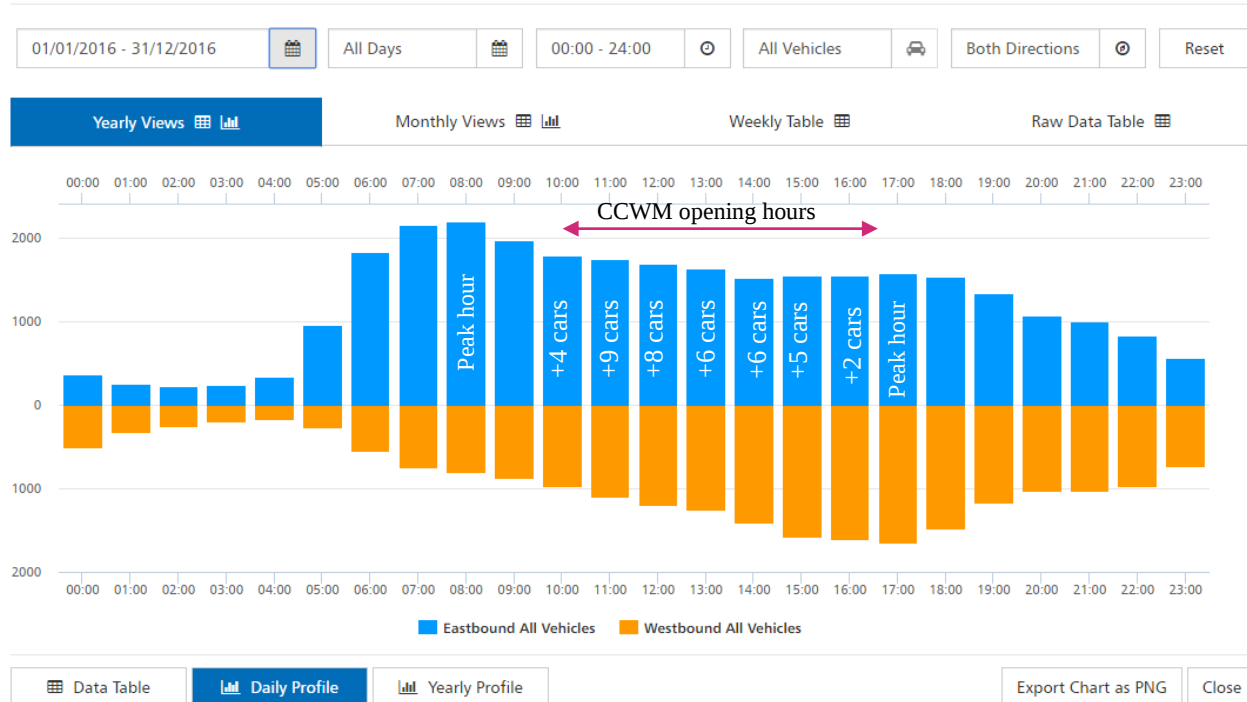


Figure 3: Weekday hourly profile of traffic along Parramatta Road for the year 2016

Source: on Parramatta Road Permanent Counter 19065, 01/10/2016 to 31/12/2016 data

2.5 Operational traffic impacts

Assuming traffic arrives from each direction in equal proportions, the additional traffic generated by the site during the peak visitation hour is shown in Figure 4. The traffic distribution results in negligible impacts to the surrounding road network.

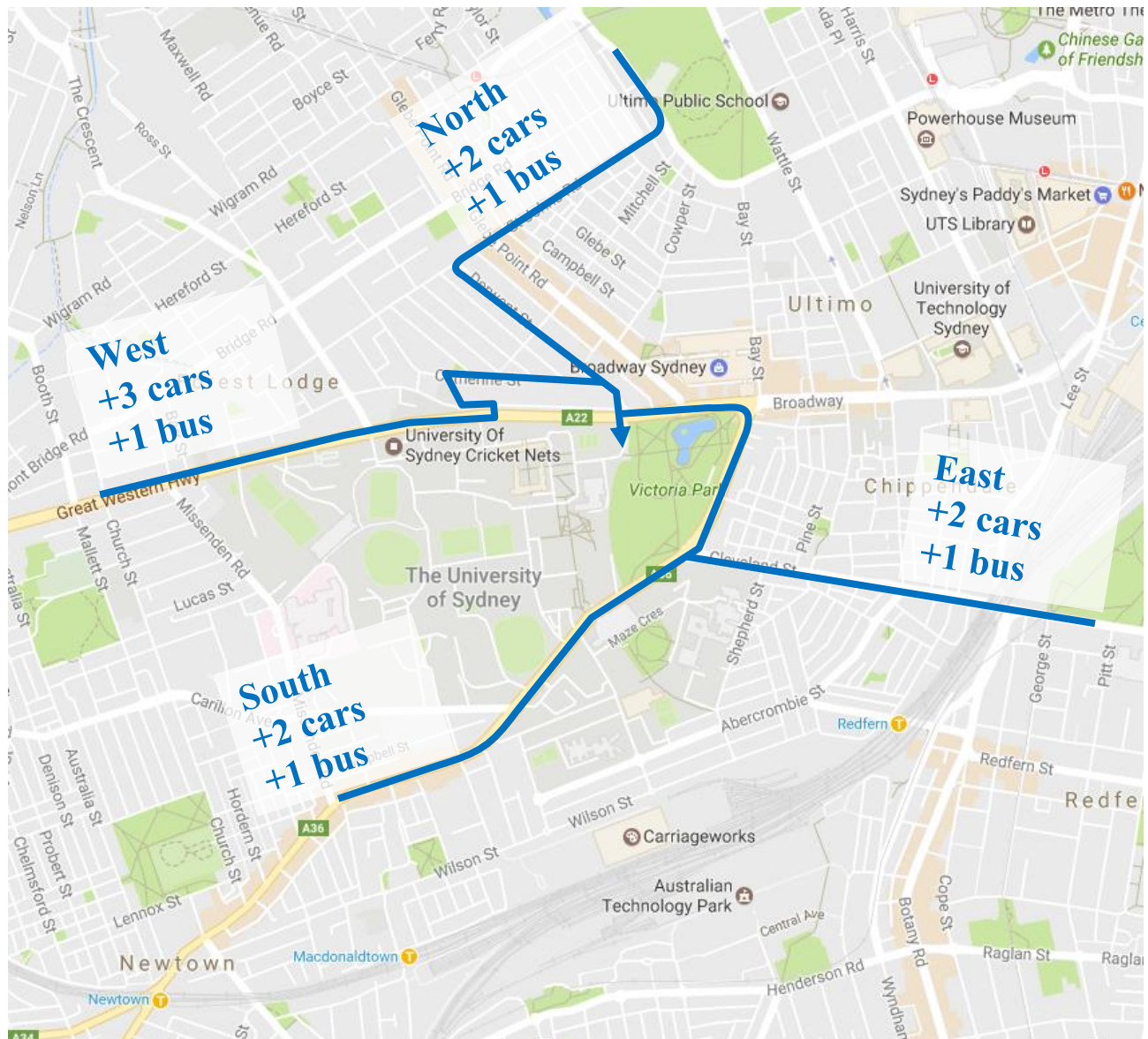


Figure 4: Additional traffic and distribution at 11am, peak museum visitation hours

2.6 Construction traffic impacts

The construction traffic generated from each building in the university is shown in Table 2 of the Transport and Accessibility Impact Assessment SSDA 16017. The FASS (P.D. Scott Biggs) and CCWM buildings will generate some 20 to 30 trucks and 10 to 12 light vehicles per day and will use Parramatta Road. Parramatta Road carries some 40,000 to 50,000 vehicles per day. The increase in 30 to 42 construction related vehicles per day is an increase of 0.075% to 0.105% in vehicles per day which is considered to have little or no effect on the existing road network.

Moreover construction vehicles are likely to arrive outside of peak hours. The majority of construction vehicle activity occurs between 9:00am and 3:00pm. The increase to existing traffic along Parramatta Road is shown in Table 2.

Table 2: Proportional increase to existing traffic as a result of cumulative construction vehicles

Time	Existing two way traffic on Parramatta Road*	Additional construction vehicles arriving	% increase of traffic along Parramatta Road
8:00am (peak hour)	3,006	No construction trips	0%
9:00am - 3:00pm	3,000 (average per hour)	+5 to +7 vehicles/hour	0.17% to 0.23%
5:00pm (peak hour)	3,224	No construction trips	0%

Note*: Based on Parramatta Road Permanent Counter 19065, 01/10/2016 to 31/12/2016 data

2.6.1 Access Routes

The expected construction material will be from the greater Sydney metropolitan area, with the bulk of deliveries in the form of concrete trucks considered to be from Blackwattle Bay or St Peters.

Right turns are not permitted into University Avenue from Parramatta Road. Construction vehicles would take the routes shown in Figure 5. Larger vehicles travelling from the western side of Parramatta Road would have to make a detour to the Princes Highway, rather than use Catherine Street.

For the purpose of this traffic analysis, we have assumed that

- 30 trucks and 12 light vehicles will access the site per day
- 5 trucks and 3 light vehicles will access the site during peak hours. This is considered a highly conservative assessment given that construction vehicles generally avoid commuter peak periods.

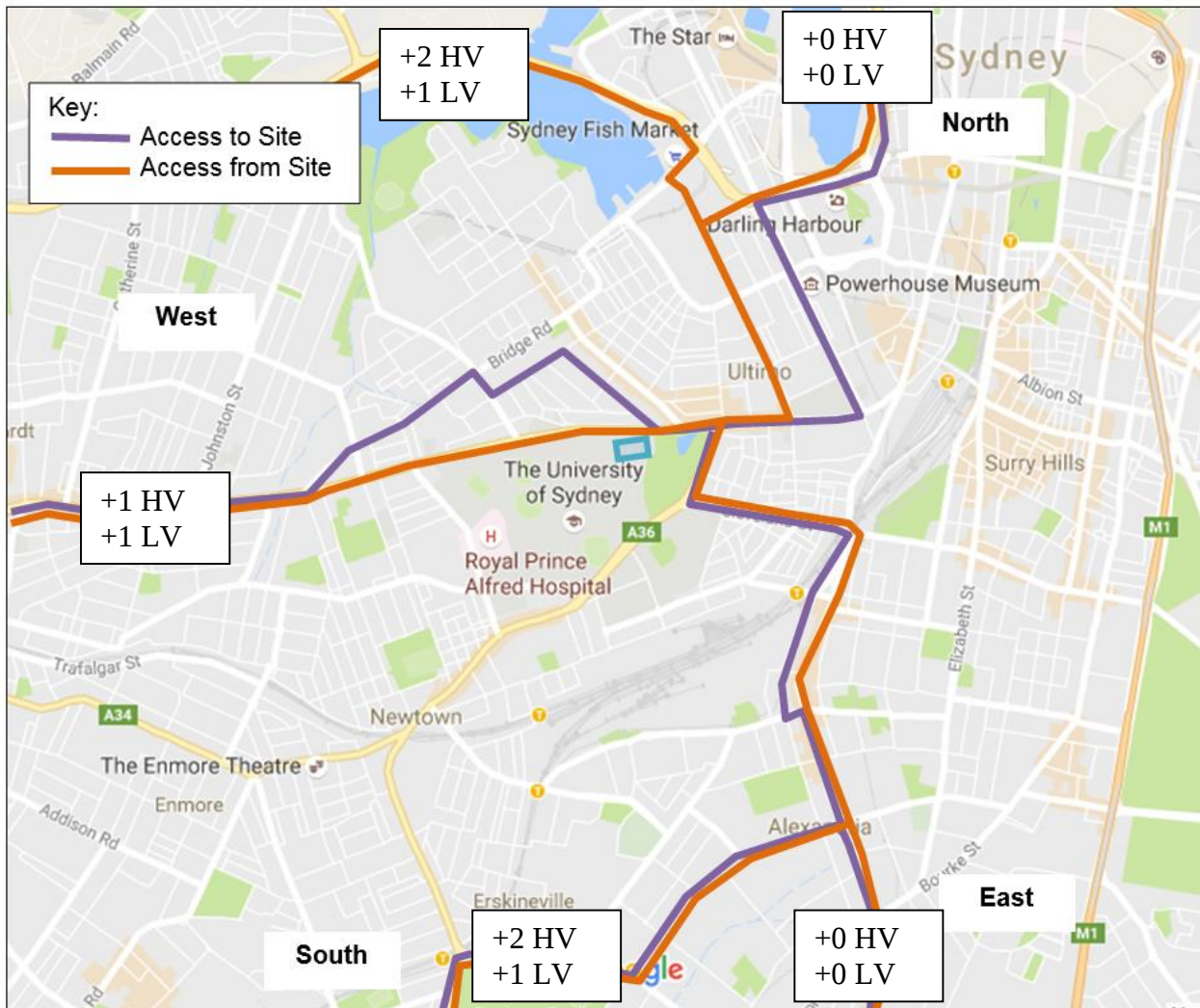


Figure 5: Suggested routes for construction vehicles and estimated peak hour increase

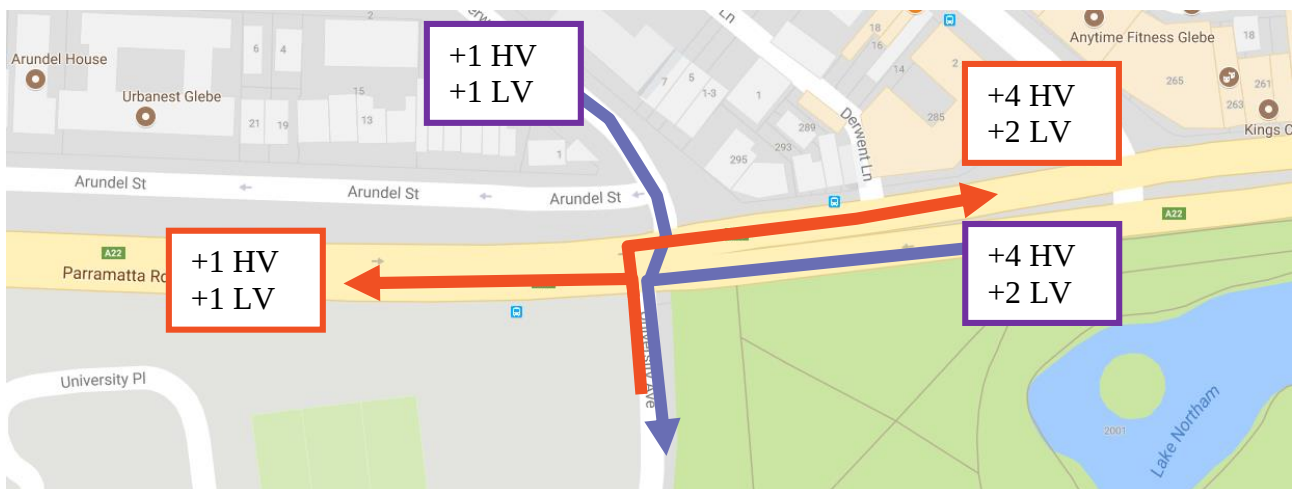


Figure 6: Assumed peak hour increase in construction vehicles accessing the site via the Parramatta Road / Derwent Street / University Ave intersection

The daily construction traffic increase on each key road is shown in Table 3. It shows a negligible increase on state roads of no more than 2 heavy vehicles and 1 light vehicles during peak hours. Derwent Street will only be used by vehicles entering the site, and is anticipated to have no more than 1 heavy and 1 light vehicles generated during peak hours.

Table 3: Traffic increase on key routes

Level of Service	Vehicle type	Additional HV	Additional LV
Wattle Street in Glebe	State	+2	+1
Derwent Street in Glebe	Local	+1	+1
St Johns Road in Glebe	Local	+0	+0
Ross Street in Forest Lodge	State	+1	+1
Pymont Bridge Road in Camperdown	State	+1	+1

2.6.2 Modelling assessment criteria

A SIDRA analysis has been carried out for the key Parramatta Road / University Avenue / Derwent Street intersection.

The intersection has been assessed using RMS approved software SIDRA software. The existing intersection performance is assessed in this report in terms of the following three factors for each intersection.

- Degree of Saturation
- Average Delay (Seconds per vehicle)
- Level of Service

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LoS), is based on the average delay per vehicle. LoS ranges from A = very good to F = unsatisfactory (see Table 4).

Table 4: Level of service criteria for intersections

Level of Service	Average delay (seconds)	Description
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At Capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode
F	Greater than 71	Unsatisfactory with excessive queuing

Another common measure of intersection performance is the degree of saturation (DoS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DoS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum degree of saturation for an intersection is 0.9.

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Traffic counts

Arup has commissioned Matrix to carry out 24 hour intersection turning counts at the Parramatta Road / Derwent Street / University Ave intersection. The survey recorded the following peak hours

- AM Peak 8:00am to 9:00am
- PM Peak 4:00pm to 5:00pm

2.6.3 SIDRA results

The SIDRA analysis shows that the Parramatta Road / Derwent Street / University Ave intersection is performing efficiently at a level of service C. A conservative future estimate of construction vehicles accessing the site has assumed:

- A cumulative construction traffic generation from University of Sydney
- 5 trucks and 3 light vehicles will access the site during peak hours and leave within the same hour

The future traffic model (with construction traffic) has predicted a slight increase in average delay to the intersection and no change to the existing level of service. As such, the cumulative construction traffic generated by the site and other buildings within the school, is not anticipated to affect the key road network adversely.

Table 5: SIDRA results Parramatta Road / Derwent Street / University Ave

Scenario	Average Delay	Level of Service	Degree of Satn.
AM Base	30.4	C	0.788
AM Base + Construction Traffic	30.6	C	0.788
PM Base	29.5	C	0.817
PM Base + Construction Traffic	29.8	C	0.817

2.6.4 Parking

It is likely that on-site parking will not be provided for private construction vehicles, with construction vehicles utilising works zones and internal circulation routes. Construction workers will be encouraged to take public transport to the site or car pool and store their larger tools on site.

Alternatively, parking is available on the southern side of Parramatta Road near the site, outside of Bus Lane times which commence between:

- 6:00am to 10:00am
- 3:00pm to 7:00pm

2.6.5 Traffic diversions

Works will be conducted predominantly within the site. No external pedestrian, traffic or cycle routes would be affected by the construction works. Internal circulation has been discussed in the Arup Transport and Accessibility report.

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3 Key traffic findings

CCWM would result in the co-location and consolidation of the Macleay Museum, Nicholson Museum and University Art Gallery as well as collections from a number of currently fragmented locations into a new single museum.

Staff Numbers

Staff numbers required for the new museum are expected to remain static given the consolidation of the museums. No additional traffic is likely to be generated from staff.

Increased visitor numbers

Increased visitor numbers are likely to be minimal given that existing visitors of the three museums would be consolidated to the CCWM. However, a 30% increase is assumed for the purpose of this report. This results in 353 additional visitors per day.

Visitors generating traffic

About half the visitors are school related visits, with students arriving by bus or train. Non-school related visitors, will arrive by car, active transport or public transport. A driver rate of 24% based on JTW data results in some 40 additional cars generated per day by visitors (conservative assumption).

Operational traffic impact

Traffic generation is minimal given the typical arrival profile of visitors. Based on the profile, the weekday peak hour period at 11am would generate some 9 vehicles. Minimal arrivals are expected during the AM and PM road network peak hours, given the CCWM opening hours of 10:00am to 4:30pm.

Given the small increase in traffic generated by the CCWM, mostly in the off-peak periods, there is anticipated to be no additional impact the surrounding road network and intersections.

For school bus access, this equates to an additional 3 buses per day, or less if train is used.

Construction traffic impact

Cumulative construction traffic generated from the university is expected to be between 20 to 30 trucks and 10 to 12 light vehicles per day and will use Parramatta Road. Construction vehicles are likely to arrive outside of peak hours and therefore have little or no effect on the peak hour road network operations. Modelling using conservative traffic generation estimates have indicated that the key Parramatta Road / Derwent Street / University Ave will have a minor increase in average delay but continue to perform at an equal level of service.