Your ref
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Department of Planning and Environment,
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4 August 2017

Dear Sir/Madam

Sydney Metro Martin Place Station Precinct - Traffic and Transport Matters Raised

The Department of Planning and Environment and Roads and Maritime Services have raised a number of traffic and transport related matters in relation to Stage 1 SSD DA (17_8351) for the Sydney Metro Martin Place Station Precinct project. Arup, on behalf of Macquarie Corporate Holdings Pty Limited, have prepared the following response to these matters:

Department of Planning and Environment

Provide an assessment of construction impacts, including cumulative impacts with the metro construction works (DPE)

A Construction Pedestrian and Traffic Management Plan has been prepared which considers the construction impacts of the development, including cumulative impacts with the Metro construction works. The approved CSSI approval for the Metro estimated that during the excavation period there would be up to 25 heavy vehicles and 10 light vehicles per hour. During peak times this reduces to 6 heavy vehicles and 2 light vehicles per hour.

The proposed development increases the level of construction activity by increasing the extent and size of above and underground works above the works contemplated by the CSSI approval. Therefore, the truck activity identified in the approved CSSI will increase proportionally based on spoil removal and materials handling for construction. It is estimated that:

- Station excavation and fit-out involves an increase of between 30% and 50% in activity owing to the enlarged site. This will extend the period of excavation but is not anticipated to increase the level of vehicle activity at any one point in time.
- Demolition activity will increase by the inclusion of 9-19 Elizabeth Street, however the timing of demolition for this building is expected to occur after demolition of the other buildings and hence activity associated with this will not increase demolition truck movements at any point in time.

- Tunnel excavation has remained the same.

The constrained nature of the site within the CBD means that it would not be able to accommodate any increase in traffic volumes above that identified in the CSSI approval. The main construction routes to and from the site are anticipated to be similar to those identified as part of the CSSI approval and thus, no change in the predicted level of service at key intersections during peak periods is predicted.

Roads and Maritime Services

1. *The layout of any proposed loading/parking areas associated with the subject development should be in accordance with AS2890.1-2004, AS2890.6-2009 and AS2890.2-2002 for heavy vehicle usage.*

   Noted. The loading dock will be designed to accommodate the design vehicles in accordance with AS2890.2.

2. *The proposed loading dock capacity should be adequate to cater for the full service vehicle demands of the ultimate development.*

   Noted. The logistics assessment will determine the loading requirements for the development. A loading dock management system will be used to schedule all deliveries to ensure dock capacity is utilised efficiently.

3. *The proposed vehicular access points for the loading dock should be located as far as reasonably practical away from the traffic signal controls on Castlereagh Street.*

   The loading dock vehicle access is located mid-block between traffic signals on Castlereagh Street to minimise impacts on traffic flow.

4. *All vehicle should enter and exit the site in a forward direction. The swept path of the longest vehicle entering and exiting the development, as well as manoeuvrability through the site, should be in accordance with AUSTROADS. In this regards, a plan shall be submitted to Council for approval, which shows that the proposed development complies with this requirement.*

   Swept paths have carried out based on the current layout which comply with AUSTROADS in terms of accessing the development and manoeuvrability. As part of the Stage 2 DA, swept paths will be provided which clearly show compliance with AUSTROADS requirements.

5. *The proposed development will generate significant additional pedestrian movements in the area. The applicant should demonstrate that proposed pedestrian facilities for access to the public transport network will be adequate to cater for future demands on key pedestrian desire lines. Pedestrian modelling should be undertaken in consultation with TfNSW Sydney Coordination Office and Council. Consideration should be given to provided subterranean pedestrian links to accommodate the additional demand where required.*

   This has been addressed through the attached pedestrian modelling technical note, considering the implication and acceptability of the designed path-width with the forecasted pedestrian loading. It is noted that the scope of the Metro Martin Place

works extends only to the boundary of the site as stipulated by the CSSI and SSDA approvals.

6. *In due course a Construction Traffic Management Plan detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control would need to be submitted to Council and the TfNSW Sydney Coordination Office for review and approval, prior to the commencement of any works. This will need to consider the altered access arrangements for existing Martin Place rail users during construction. The proposed construction methodology will need to consider how customers get to and from bus services and taxis in Castlereagh Street and Elizabeth Street and across their respective Martin Place mid-block pedestrian crossings. It will need to be demonstrated that the proposal can be constructed while the impact to rail users (and their connections) are appropriately managed.*

   A outline CPTMP plan has been prepared as part of the Stage 1 SSD DA, however a more detailed CPTMP along with traffic control plans, work zones etc. will be prepared at the relevant time considering the latest construction planning.

Yours sincerely

John Fahey
Senior Engineer

Enc Pedestrian modelling technical note

Technical Note

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Project title	Sydney Metro Martin Place Station	Job number	247838-00
cc		File reference	
Prepared by	Manuel Lawrence Paul Stanley	Date	5 May 2017
Subject	Pedestrian Analysis (Street Level)		

1 Introduction

This Technical Note documents the expected pedestrian impact of the proposed Over Station Development (OSD) at Martin Place Station (Metro).

The proposed OSD aims to increase building populations over existing conditions. The increase in building populations is likely to increase pedestrian movements at street-level. This assessment investigates the increase in pedestrian flows to determine the expected impact to the pedestrian network.

2 Assumptions

Martin Place Station (Metro) Assumptions

- Base condition assumes Martin Place Station (Metro) is in operation.
- The arrival profile from Station is as follows:

Time	Percentage of AM peak hour
8:15 – 8:30	23%
8:30 – 8:45	27%
8:45 – 9:00	27%
9:00 – 9:15	23%

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- AM Peak Martin Place Station (Metro) alighting and boarding distributions

Figure 1 AM peak hour Martin Place Station passenger alighting distribution (left) and boarding distribution (right). Source: EIS, Traffic and Transport, May 2016.

Over Station Development (OSD) Assumptions

- OSD populations

Item	Existing	Proposed (updated)
South Tower	817	4,539
50 Martin Pl	1,900	1,900
North Tower	1,689	7,961
Total	**4,406**	**14,400**

- OSD arrival profile

Period	Percentage of split
Peak hour	56% of building population
Peak 15 minute	30% of peak hour
Peak 1 minute	2.5% of peak hour

- OSD mode split (Source: Journey to Work, 2011)

Mode	Percentage split
Train	51%
Bus	25%
Ferry/Tram	3%
Car	14%
Walk	5%
Other	1%

Note: Ferry/Tram, Car, Walk and Other are combined into one mode for the precinct distribution figures, labelled as "Other (walk-up)".

- OSD train station split – the future Sydney train network and the choice of two well-connected Martin Place stations results in a high percentage of OSD passengers alighting at either Martin Place or the Metro station, even if they're not on a direct route to the stations. For example, those travelling from the north are likely to have an easy interchange at Chatswood Station (same platform), and those from the west have easy opportunities to interchange at Town Hall Station (P3=>P5, P6=>P5). Only those from Airport Line direction will walk from St James Station as the interchange at Central Station is not as attractive compared to walking at street level.

Station	Assumed for future modelling
Wynyard Station	0%
Martin Place Station (ESR/Metro)	94%
St James Station	6%

- OSD precinct distribution

Figure 2 AM precinct distribution for OSD for arrival demand.

General Assumptions

- Nominal footpath width of 2m is adopted throughout the precinct. This is considered a conservative assumption and a minimum expected across the pedestrian network. Where analysis indicates performance levels are not achieved, further examination of the pavement width has been explored.
- Width of 16m is adopted for the Martin Place entrances from Castlereagh Street and Elizabeth Street.
- Fruin Level of Service, Walkways metric has been adopted to assess the performance. The flow rates for each band are given in the table below.

Level of Service	Lower (people per metre per minute)	Upper (people per metre per minute)
A	0	23
B	23	32.8
C	32.8	49.2
D	49.2	65.6
E	65.6	82
F	82	-

3 Reference Performance – AM Peak Hour

Pedestrian modelling of the Martin Place Station precinct has been undertaken as part of the Chatswood to Sydenham Environmental Impact Statement (EIS). Outputs from the reference case pedestrian modelling demonstrates the expected street-level performance during the AM peak hour at Martin Place Station, taking into consideration both demands from the station and background flows.

The outputs indicate the majority of footpaths perform at a desirable Level of Service (LoS) A/B (Fruin, Walkways). Three sections of footpath perform at a higher density of LoS C:

- LoS C – Hunter Street west on the north side (3,550 people in peak hour)
- LoS C – Hunter Street west on the south side (3,400 people in peak hour)
- LoS C – Elizabeth Street on the east side between Martin Place and Hunter Street (2,575 people in the peak hour)

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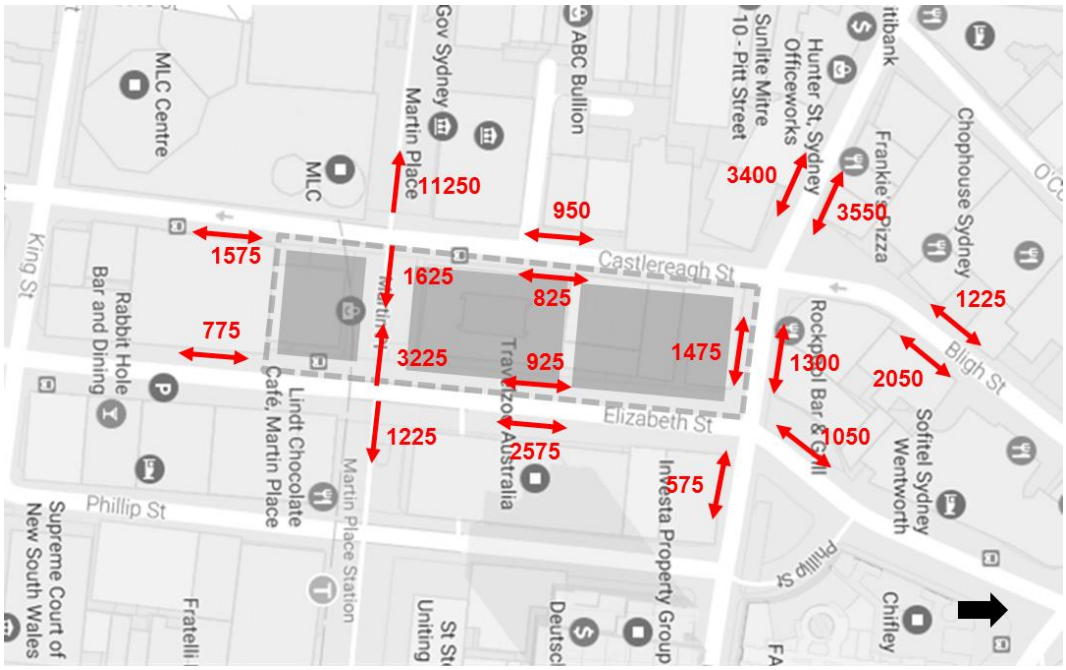

Figure 3 Martin Place Station - 2026 AM peak hour pedestrian modelling results (Source: EIS, Traffic and Transport, May 2016)

Arup have compared the EIS data with 2026 rail forecasts provided by TfNSW. The EIS data is considerably higher (by a factor of 2) and hence, although not specifically noted, the volumes stated are assumed to include both rail data and background data.

A review of the model outputs indicate the pedestrian flows in the precinct provide good performance levels, within Fruin Level of Service C, Walkways. The Fruin Level of Service noted within the EIS report is analysed across a flat 1-hour profile. Arup's approach is to factor a higher percentage in both the peak 15 minutes of the hour, as well as the peak minute to reflect surges in train arrivals. This is a more conservative approach.

4 Analysis – AM Peak

This analysis applies a conservative and transparent approach to understand the impact of the proposed OSD. Seven key movement corridors (cordons) located adjacent to the OSD are used for this analysis, as shown in Figure 4.

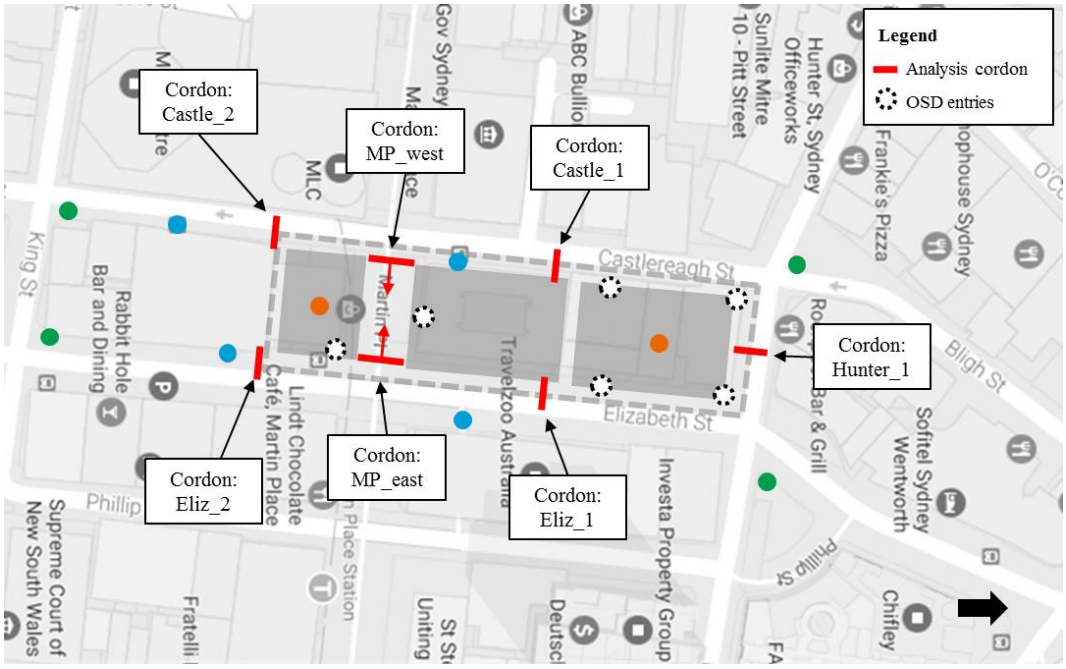

Figure 4 Analysis cordon locations adjacent to the OSD.

Route Choice

An important part of the assessment is to identify the OSD related pedestrian routes through the precinct for each of the North Tower, South Tower and 50 Martin Place buildings. Route choice from the precinct has been informed using shortest route analysis in MassMotion pedestrian modelling software which dynamically assigns routes from platform to street zones based on a least cost (time) algorithm. The routes adopted for the analysis are shown in the Appendix.

Volumes across Cordon Lines

Static analysis is then undertaken to determine the expected OSD flows at each of the cordon locations. The future OSD flows are added to the EIS flows to determine a combined peak flow. This method adopts the EIS numbers as the base *background* demand including Metro. This is highly conservative as the EIS demand also includes assumptions about the OSD developments. Extracting the proportion that reflects our specific developments versus the wider land use is difficult. As such, to provide a robust conservative approach, the analysis assumes the EIS data excludes the specific OSD data.

Performance of EIS data (Metro + background)

The EIS outputs as presented indicate LoS A is achieved at all cordon locations. However the EIS outputs average a one-hour demand to determine the level of service. This effectively flattens the peak demand. Table 1 demonstrates the calculated EIS flow rates at the seven cordons using the factors detailed in the assumptions (“OSD Arrival Profile”) to convert peak hour demand to peak minute. The outcome remains LoS A across the cordons.

Table 1 EIS pedestrian flows and level of service at cordon locations. *people per metre per minute

Cordon >	Castle_1	Castle_2	Eliz_1	Eliz_2	Hunter_1	MP_east	MP_west
ppm/min	10.3	19.7	11.6	9.7	18.4	2.5	5.0
LoS (walkways)	A	A	A	A	A	A	A

Performance of EIS data (Metro + background + Existing OSD sites)

The existing OSD populations are calculated to determine the collective OSD 1-min peak demand at each cordon. This flow is added to the EIS base demand for an estimated peak flow with the OSD. The results for the existing population show the footpaths perform at LoS A/B, see Table 3. These are desirable conditions and indicate the footpaths can accommodate greater flows.

Table 2 Pedestrian flows and level of service for OSD (existing population) + EIS base demand. *people per metre per minute

Cordon >	Castle_1	Castle_2	Eliz_1	Eliz_2	Hunter_1	MP_east	MP_west
OSD (ppm/min)	3.0	4.7	7.0	2.8	0.0	0.9	0.9
EIS (ppm/min)	10.3	19.7	11.6	9.7	18.4	2.5	5.0
Total	13.3	24.4	18.5	12.5	18.4	3.4	6.0
LoS (walkways)	A	B	A	A	A	A	A

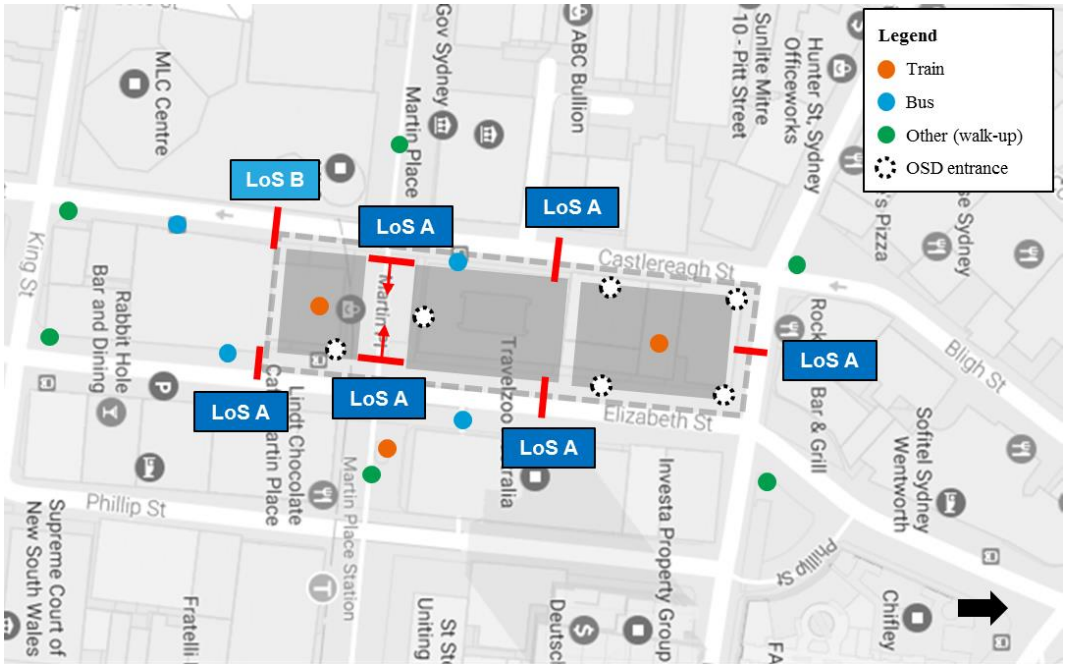

Figure 5 Pedestrian performance for OSD (existing population) + EIS base demand.

Performance of EIS data (Metro + background + Proposed OSD sites)

The proposed OSD populations are then applied to calculate the peak 1-min flow at each cordon location. These are added to the EIS base flows shown in Table 1 to determine the updated peak flow. Table 3 shows the footpaths perform within a desirable LoS C. Five of the seven cordon locations maintain LoS A. A single cordon on the west side of Elizabeth Street (Eliz_1), between Martin Place and Hunter Street, performs at LoS C. This is still a desirable flow rate given its locality close to a transport hub, although it is an increase over the base conditions. Further examination of cordon 'Eliz_1' on the western footpath of Elizabeth Street indicates an estimated clear width of 3m. The resultant performance is LoS B walkways (28.2 ppm/m).

Table 3 Pedestrian flows and level of service for OSD (proposed population) + EIS base demand.

Cordon >	Castle_1	Castle_2	Eliz_1	Eliz_2	Hunter_1	MP_east	MP_west
OSD	11.0	7.6	30.7	9.2	0.0	0.9	1.6
EIS (base)	10.3	19.7	11.6	9.7	18.4	2.5	5.0
Sum (ppm/min)	21.3	27.3	42.3	18.9	18.4	3.4	6.7
LoS (walkways)	A	B	C^	A	A	A	A

^ further analysis shows that the pavement width in this location is greater than the 2m assumed, which results in an estimated performance of LoS B (walkways).

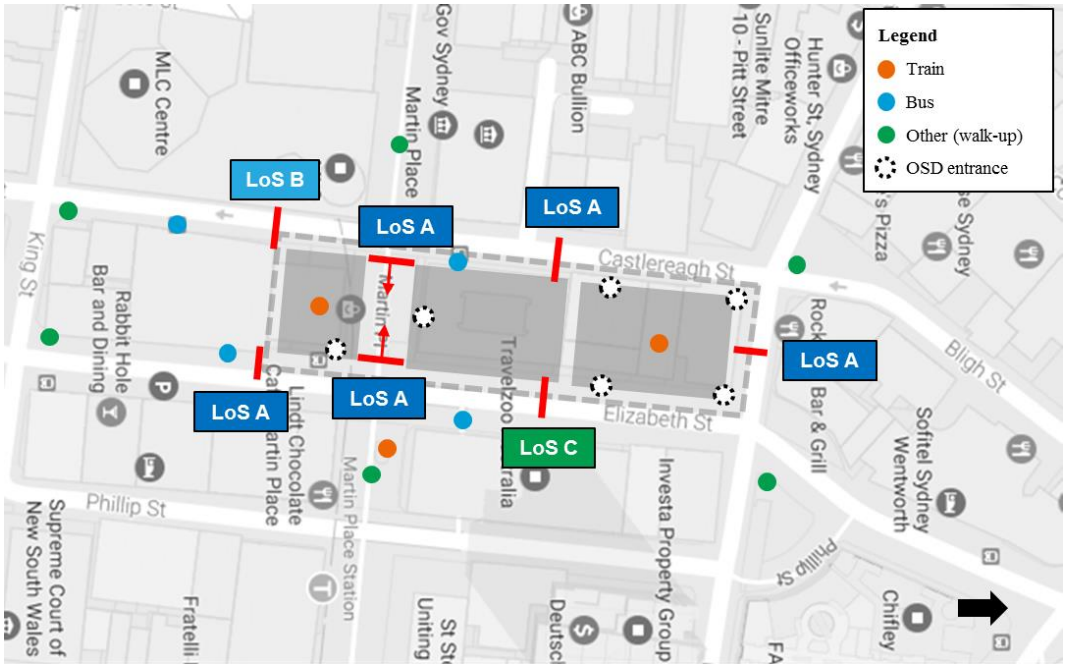

Figure 6 Pedestrian performance for OSD (proposed populations) + EIS base demand.

5 Summary

The proposed OSD populations with Metro and background demand at 2026 maintains a suitable Fruin Level of Service (walkways). This analysis assumes a nominal accessible width of 2m across the pedestrian network (excluding Martin Place pedestrian zone) which is likely to be conservative but makes provision for elements of street furniture and obstructions.

The list below documents key areas to consider with respect to the street-level performance.

- Elizabeth Street west (Eliz_1) is subjected to increased flows that is likely to perform at LoS C, for a given width of 2m but LoS B (walkways) given the width is closer to 3m at this location.
- Elizabeth Street west (adjacent to the proposed South Tower entrance) is subjected to higher flows due to the attraction of the single entrance. This area is expected to perform at LoS C walkways however the flow rates are complex and should be reviewed in closer detail with respect to the South Tower entrance and design.

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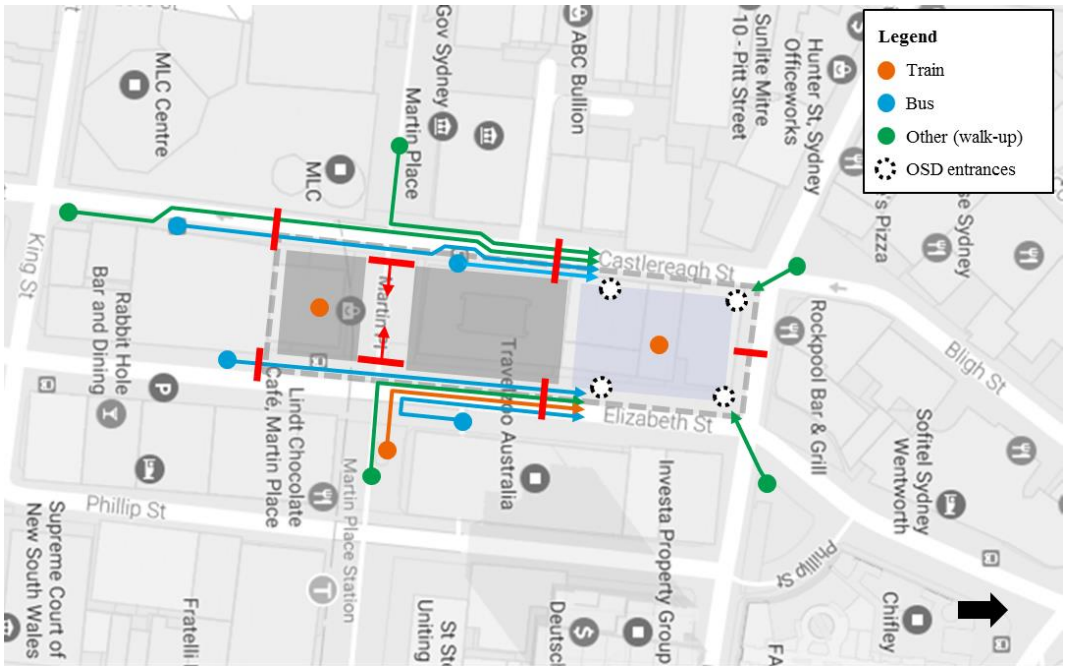
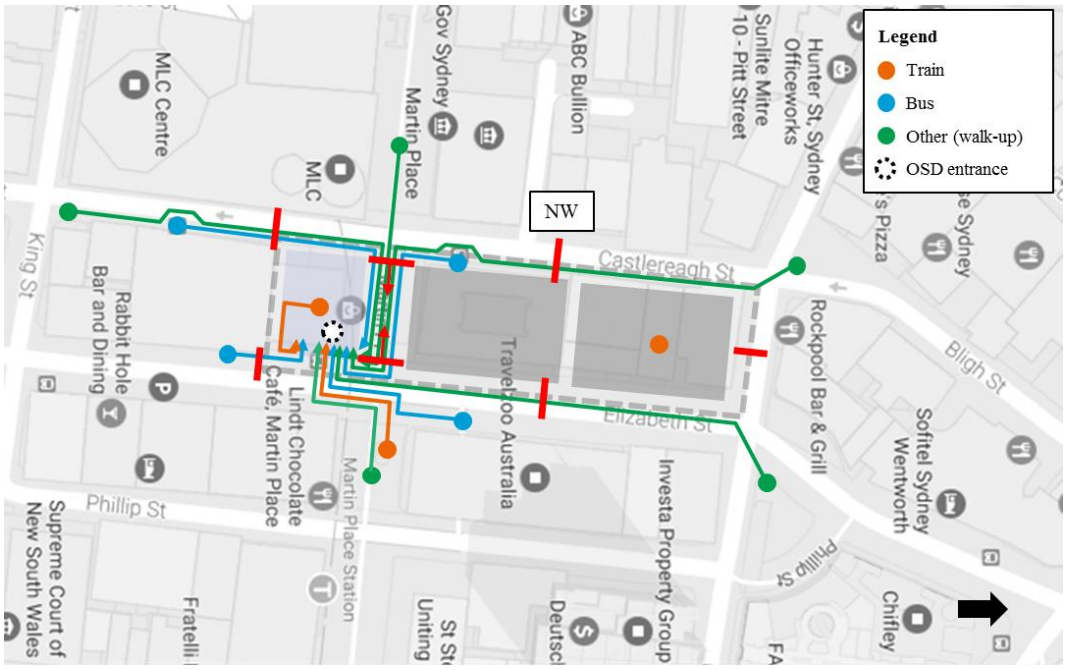
Appendix – OSD Pedestrian Route Maps

North Tower routes from precinct and available modes.



South Tower routes from precinct and available modes.



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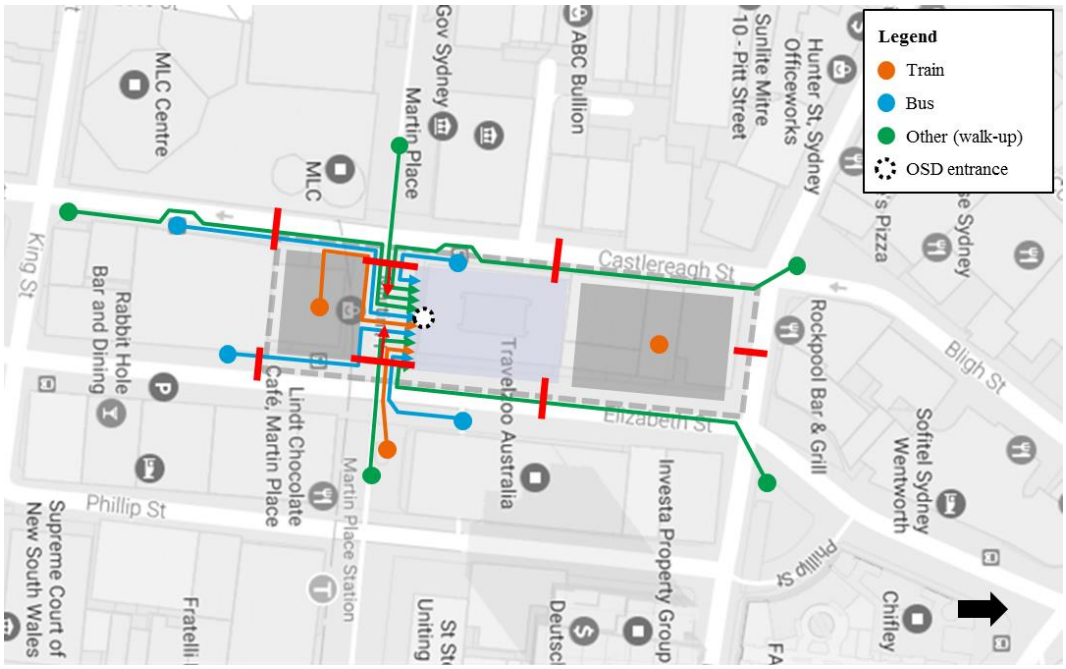
50 Martin Place routes from precinct and available modes.



DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
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