

# Appendix I **Barangaroo-Wynyard Station Traffic Management Plan**







# CBD Metro TA 2108 Transport and Access Advisor

## Barangaroo-Wynyard Station – Traffic Management Plan

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Sydney Metro

24 August 2009

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## Barangaroo-Wynyard Station – Traffic Management Plan

Prepared for

**Sydney Metro**

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## Glossary

Term	Acronym / Abbreviation	Description
Acoustic		Pertaining to the sense of organs of hearing, or to the science of sound.
Ambient		Surrounding or existing.
Bored tunnel		An underground tunnel constructed by a tunnel boring machine.
CityRail Station		Existing rail station on the CityRail network
Construction Environmental Management Plan	CEMP	A document setting out the management, control and monitoring measures to be implemented during construction of a development, to avoid or minimise the potential environmental impacts identified during an environmental impact assessment process.
Construction site (or worksite)		Land required for construction activities associated with the project (including storage, amenities, site offices, etc), and may be required for the construction and commissioning phases. A construction site may be temporary (e.g. for Enabling Works such as adjustment to a water main) or long term (e.g. a station construction worksite).
Construction Environmental Management Plan	CEMP	A document setting out the management, control and monitoring measures to be implemented during construction of a development, to avoid or minimise the potential environmental impacts identified during an environmental impact assessment process
Construction Traffic Management Plan	CTMP	Construction Traffic Management Plan is a document prepared for each stage of construction work, and describes the impact and mitigation measures to address changes to traffic conditions resulting from discreet elements and stages of construction activity.
Crossover		Track form to allow trains to move to an adjacent track.
Cut and cover construction		Method of construction for underground structures where a hole is excavated from the surface down, the structure is built and then covered.
Director-General's requirements		Requirements for an environmental assessment issued by the Director-General of the Department of Planning in accordance with the Environmental Planning & Assessment Act 1979.
Diamond Crossover		Two crossovers located adjacent to each other in a diamond formation.
Earth Pressure Balance Machine		Is a mechanised tunnelling method in which spoil is admitted into the tunnel boring machine (TBM) via an arrangement which allows the pressure at the face of the TBM to remain balanced without the use of slurry.
Framework Traffic Management Plan	FTMP	Framework Traffic Management Plan is a document which outlines the processes and systems to be established to control traffic issues which are common to all Metro Worksite locations.
Integrated Metro Operations	IMO	Integrated Metro Operations is responsible for running the Metro Operation, within the permanent route infrastructure and refers to all running systems and operations required to operate the Metro.

Term	Acronym / Abbreviation	Description
IMO contractor		Integrated Metro Operations contractor responsible for rollingstock, rail systems, tunnel services, and station building works, fitout and services including mechanical and electrical.
IMO construction contract		The agreement between the project company and the construction contractor to undertake the IMO works
IMO site access plan		The plans of that name that form part of the project management plans and must be updated by the project company in accordance with the plan and reports schedule
IMO construction traffic management plan		Plan for site access for contractors and public during construction and operation phases.
Geotechnical conditions		Relating to the form, arrangement and structure of geology, soils etc.
Kiss-and-ride		Where a car passenger is dropped off at a public transport station/bus interchange by a private car. This is generally by a family member, hence the 'kiss' goodbye.
Maintenance depot		Land including buildings and facilities for the maintenance of the Metro system, including rolling stock and the infrastructure.
Metro railway		A guided system designed to transport passengers on a railway track, together with its infrastructure and associated sidings, that: (a) provides high-frequency commuter and other passenger services, and (b) is operated using automated systems, that are integrated with trains, from one or more central control points, and (c) is operated using dedicated rail infrastructure facilities that are not operationally connected with other types of rail infrastructure facilities.
Metro railway system		(a) a metro railway and its rail infrastructure facilities, and (b) stations, platforms, maintenance facilities, depots and other transport interchanges, works, structures and facilities associated with or incidental to the metro railway or rail infrastructure facilities (including commercial and retail facilities).
Ministry of Transport	MOT	NSW Transport and Infrastructure
Paid concourse		Area of the station that can only be accessed by ticket holders.
NCLG		The Network Coordination Liaison Group is a group of stakeholders who are to be formed to ensure that construction related impacts of the CBD Metro are managed with respect to changing road demands and competing interests in the CBD over the life of the construction of the project.
Proponent		The person proposing to carry out development comprising all or any part of the project, including any person certified by the Minister for Planning to be the proponent (such certification to be obtained prior to commencement of the relevant part of the project). Sydney Metro is the proponent for the CBD Metro project.
Permanent Route Infrastructure	PRI	Comprises the civil, tunnelling works and station excavations to be designed and constructed by the PRI Contractor on behalf of Sydney Metro, for handover to the IMO contractor for construction of the IMO Works.

Term	Acronym / Abbreviation	Description
PRI Contractor		(PRI) contractor, responsible for surface works for construction of the Stabling and Maintenance Depot, tunnelling works, and excavation and retaining structures associated with the station boxes
Product		The new metro railway in total including assets, brand, systems, intellectual property, interfaces and metro services
Road header		Machine used to excavate tunnels with a boom-mounted cutting head.
Road User		A road user is any person who uses a road, driveway or footpath, and includes motorists, buses, pedestrians, cyclists, taxis etc.
Rolling stock		Standard single deck metro trains used on the metro railway.
Road Occupancy License	ROL	A Road Occupancy License is a process whereby an Authority (primarily RTA) gives its approval for an activity which involves removing one or more lane of the road from traffic or parking use to another use – usually temporary construction.
Spoil		Excess material resulting from the cut and fill balance. Generally comprises soil and rock material. All volumes refer to solid volume.
Stabling facility		Location where rolling stock (trains) are stored when not in service.
Station		Refers to proposed Metro station infrastructure, including platforms, concourse, entrance, pedestrian connections, staff facilities and associated requirements/facilities to service the station.
Station Plan		Plans that may be prepared for land on which metro railway stations are to be situated, and land in the vicinity of such metro railway stations, with respect to development, traffic and parking management arrangements, pedestrian links and access facilities, retail and commercial development associated with metro railway stations, public domain amenities and improvements, and other matters ancillary to the operation of metro railway stations and any associated transport or other facilities.
Sydney Metro		Sydney Metro is the NSW Government agency constituted under the Transport Administration Act 1988 to develop a metro railway system, including procuring the CBD Metro and possible future extensions of it.
Speed Zone Authorisation	SZA	A speed Zone Authorisation is a process whereby the RTA gives permission for a change to the speed limit.
Traffic Management Plan	TMP	A traffic management plan is a document which describes the traffic impact and management measures for a specific work area.
Traffic and Transport Liaison Group	TTLG	The Traffic and Transport Liaison Group is a group of stakeholders which will be formed to ensure those stakeholders have the opportunity to review and comment on the traffic management measures and road changes proposed to be put into place to manage traffic on and adjacent to the project.
Tunnel boring machine	TBM	Machine used to excavate tunnels with a circular cross section through a variety of soil and rock strata.

Term	Acronym / Abbreviation	Description
Turnback		Configuration of tracks allowing a train to terminate a service and return to its starting point.
Unpaid concourse		Areas of the station that can be accessed by any member of the public.
Virgin excavated natural material	VENM	Natural material (such as clay, gravel, sand, soil and rock) that: (a) is not mixed with any other type of waste; and (b) has been excavated from areas of land that are not contaminated.
Variable Message Sign	VMS	Variable message signs used to provide advance notice of upcoming works and traffic arrangements and alternate routes and traffic arrangements during the works. Subject to prior approval and availability this may include existing RTA VMS and project VMS.

## Executive Summary

This Traffic Management Plan outlines the traffic impact and traffic mitigation measures proposed to be put in place to manage construction of the Barangaroo-Wynyard Metro Station for CBD Metro and the Barangaroo Pedestrian Link Tunnel.

This Plan has been developed at an early stage based on the anticipated traffic management measures that could be selected by the successful contractor/s, once awarded. The Plan demonstrates the impacts and mitigation measures for a feasible traffic management scenario.

Traffic impacts have been determined based on worksite layouts and construction methodologies provided by the CBD Metro TA2100 adviser and are current as to the date of this report or as quoted in the text. PARAMICS modelling is being undertaken by the RTA – Halcrow to determine the traffic impact of the proposed construction traffic, utilising the CBD road network model and the results of this modelling will be presented to road authorities once available.

The following represent the major network adjustments and traffic impacts that will result due to Barangaroo-Wynyard and Barangaroo Pedestrian Link Tunnel construction sites:

- Adjustments to on street parking, loading and taxi zones;
- Potential temporary adjustment of bus standing arrangements in York Street during cut and cover activity in Kent Street;
- Adjustment to access of rear loading dock for Moreton's Hotel;
- Potential closure of Margaret Street either northern or southern footpath between Kent and Clarence Streets;
- Closure of Napoleon Street southern footpath;
- Closure of westbound carriageway of Napoleon Street and conversion of one eastbound lane to a lane westbound;
- Staged cut and cover construction across Kent Street, with adjustments to Traffic Control Signals (TCS) at Napoleon and Margaret Streets, resulting in one lane per direction operation with potential turn bans;
- Staged cut and cover construction across Sussex Street with adjustments to TCS at Shelly Street, resulting in one lane per direction with removal of turn lanes;
- Temporary closure of Shelly Street between Lime Street and Sussex Street to general traffic;
- Temporary closure of Margaret Street between Clarence and Kent Streets to all traffic for up to 9 months;
- Changes to traffic arrangements in York Lane;
- Pedestrian control gates to facilitate trucks crossing footpaths resulting in minor delays to pedestrians whilst trucks are accessing worksites;
- Temporary potential removal of peak hour right turn ban and modifications to Sydney Harbour Bridge tidal flow arrangements at Clarence Street;
- Potential reconfiguration of westbound approach lane configuration of Margaret Street on approach to Clarence Street; and
- Closure of Kent Street pedestrian tunnel and re-routeing of pedestrians via surface road network.

The major mitigation strategies recommended for implementation to manage construction impacts resulting from this TMP are:

- Truck size limited to single tipper configuration for spoil movement at Napoleon and York Lane worksites;
- Removal of kerbside parking/loading/other activity where capacity enhancement is required to cater for detoured traffic;
- Pedestrian movements to be controlled by flagmen during daytime and busy evening periods while trucks are crossing footpaths; and
- Truck routes selected that result in a minimum of disruption to bus and other critical CBD corridors.

Further detailed examination of traffic management will be undertaken through the completion of detailed Construction Traffic Management Plans covering each stage of construction for each of the 3 worksites related to Barangaroo-Wynyard and the Barangaroo Pedestrian Link tunnel.

## 1.0 Introduction

### 1.1 Project background

The CBD metro is a 7 km metro railway from Central to Rozelle and will be the first metro in a Sydney wide metro network. New metro stations are proposed at:

- Central;
- Town Hall Square;
- Martin Place;
- Barangaroo-Wynyard;
- Pyrmont; and
- Rozelle

There is also a possible future station safe guarded at White Bay.

The Barangaroo-Wynyard Metro Station is located in the north-east corner of the CBD, between the important public transport interchange hub of Wynyard, Darling Harbour, and the future Barangaroo development site. The Metro Station would be located under Margaret Street, between Sussex Street / Hickson Road and York Street. The station would be constructed underground using a large single cavern, with one cut and cover shaft required to provide construction access to the caverns in Shelly Street / Barangaroo west of Sussex Street. Another worksite will be located within the area bounded by the northern corner of York Lane and Clarence Street (York Lane site) and on the western side of Clarence Street (Clarence Street site).

The construction of the Barangaroo Pedestrian Link tunnel (BPL) also forms part of the construction activity at this Metro Station. The BPL joins Wynyard CityRail Station with the Barangaroo Development at Shelly Street. **Figure 1.1** shows the location of the Barangaroo Wynyard Metro Station and **Figure 1.2** shows the location of the Station and permanent worksites associated with construction of the Barangaroo-Wynyard Metro Station and construction of the Barangaroo Pedestrian Link Tunnel.

Figure 1.1: Location of Barangaroo-Wynyard Metro Station in context of Sydney CBD

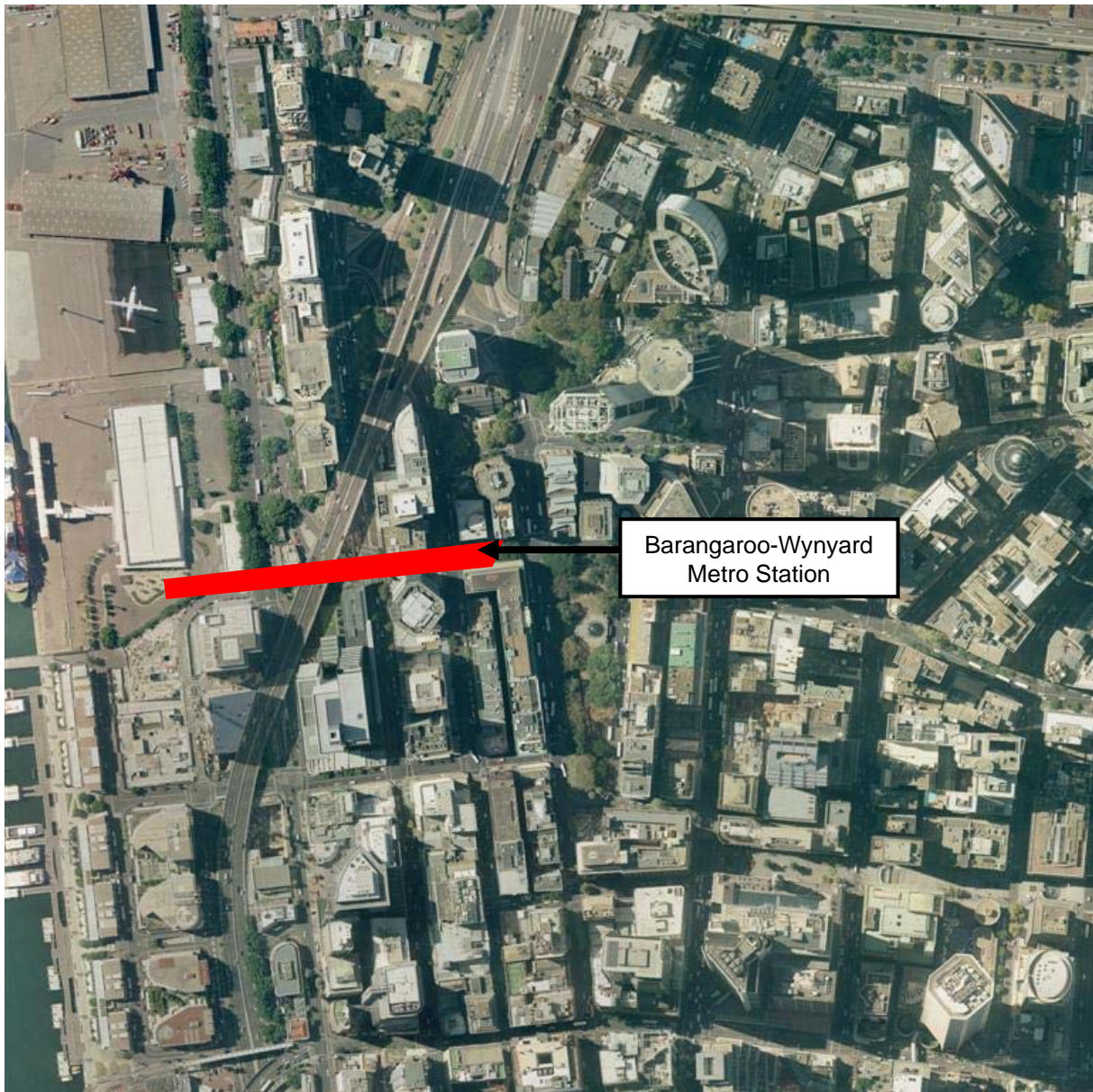
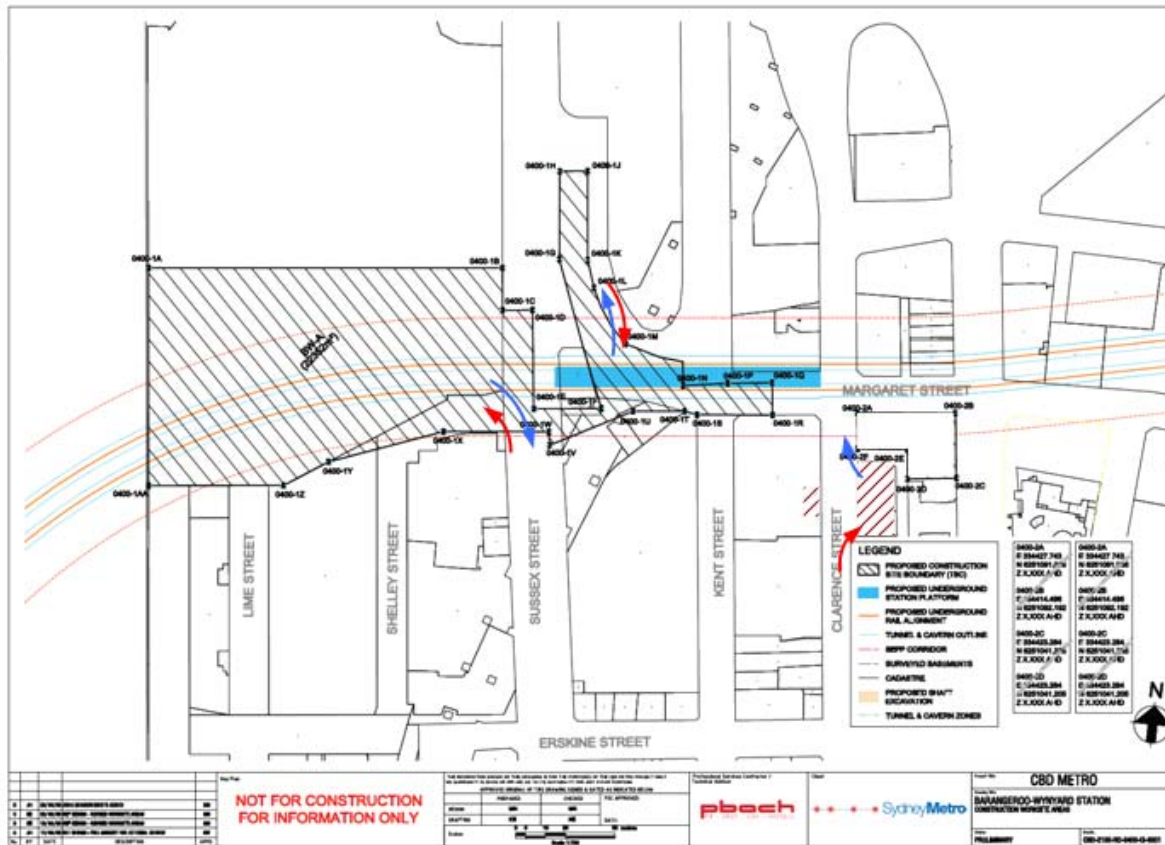


Figure 1.2: Barangaroo-Wynyard Station Worksite Locations



Source: TA2100 June 2009

## 1.2 Scope of this plan

This Traffic Management Plan (TMP) for Barangaroo-Wynyard Station outlines the construction methodology and timeframes and is based on advice from the CBD Metro Construction Technical Advisors (TA2100). The intent of the document is to determine the feasibility of construction as it relates to traffic management, and outline the impacts that are anticipated to result, and the mitigation measures proposed. The Plan also covers concept staging of works impacting on roads, transport, road works and traffic management measures to mitigate the impacts of construction.

This TMP contains information about:

- The existing traffic situation at the worksite location(s);
- What works will be carried out;
- What the resulting traffic and transport impacts will be;
- How those impacts will be managed and reduced; and
- A summary of any changes or residual impacts.

The TMP has been prepared through a consultative process with relevant stakeholders. This TMP operates under the Framework Traffic Management Plan (FTMP), which covers traffic management responses and strategic processes, which are common to all work sites, to enable construction of the CBD Metro.

The FTMP identifies a hierarchy of access that was applied in developing traffic management arrangements, i.e.:

- Incidents;
- Events;
- Pedestrians;
- Service Vehicles;
- Cycles;
- Public Transport – Buses;
- Coaches;
- Taxis; and
- Kiss n’ Ride.

A further level of traffic management detail will be contained in the Construction Traffic Management Plans (CTMP’s), which will be the responsibility of the CBD Metro PRI and IMO contractors to develop, once appointed.

The Traffic Management Plan hierarchy is as follows:

- 1) Framework TMP (Sydney Metro)
- 2) Site specific TMP’s (Sydney Metro)
- 3) Construction Traffic Management Plans - worksite specific (Contractor)
- 4) Construction Traffic Control Plans (Contractor)

CTMP’s will utilise the approvals framework created by the FTMP and information contained within the TMP documents to develop a further level of detail, once exact construction methodologies and timeframes are confirmed.

The CTMP’s will be prepared to support submissions for Road Occupancy Licenses (ROL’s) and speed zoning applications for works requiring diversions or temporary lane closures. The Traffic Control Plans (TCP’s) developed as part of the CTMP’s will provide details of changes to delineation, signage and other temporary traffic control devices, site access, public transport and pedestrian management, specific to the work activity.

This document is a live document and will evolve throughout the pre-tender phase of the project, as well as throughout the construction period.

### 1.3 Plan structure

This TMP operates under the general project requirements and policies outlined in the Framework Traffic Management Plan. The TMP outlines the site specific strategies for the Barangaroo-Wynyard Station and is structured as follows:

- |           |   |
|-----------|---|
| Section 1 | Describes the CDB Metro project and TMP process                         |
| Section 2 | Describes the Existing Transport context for Barangaroo-Wynyard Station |
| Section 3 | Proposed Work Method  |
| Section 4 | Worksite Operation and Management                                       |
| Section 5 | Traffic Management Impacts and Mitigation Measures                      |
| Section 6 | TMP Compliance and Approvals  |

## 2.0 Existing Situation

### 2.1 Transport related

#### 2.1.1 Pedestrian movements and volumes

Pedestrian site surveys conducted on the 13-15 November 2007 at various locations around Wynyard Station are shown in **Figure 2.1** below.

**Figure 2.1: Pedestrian Survey Locations Barangaroo-Wynyard Station November 2007**

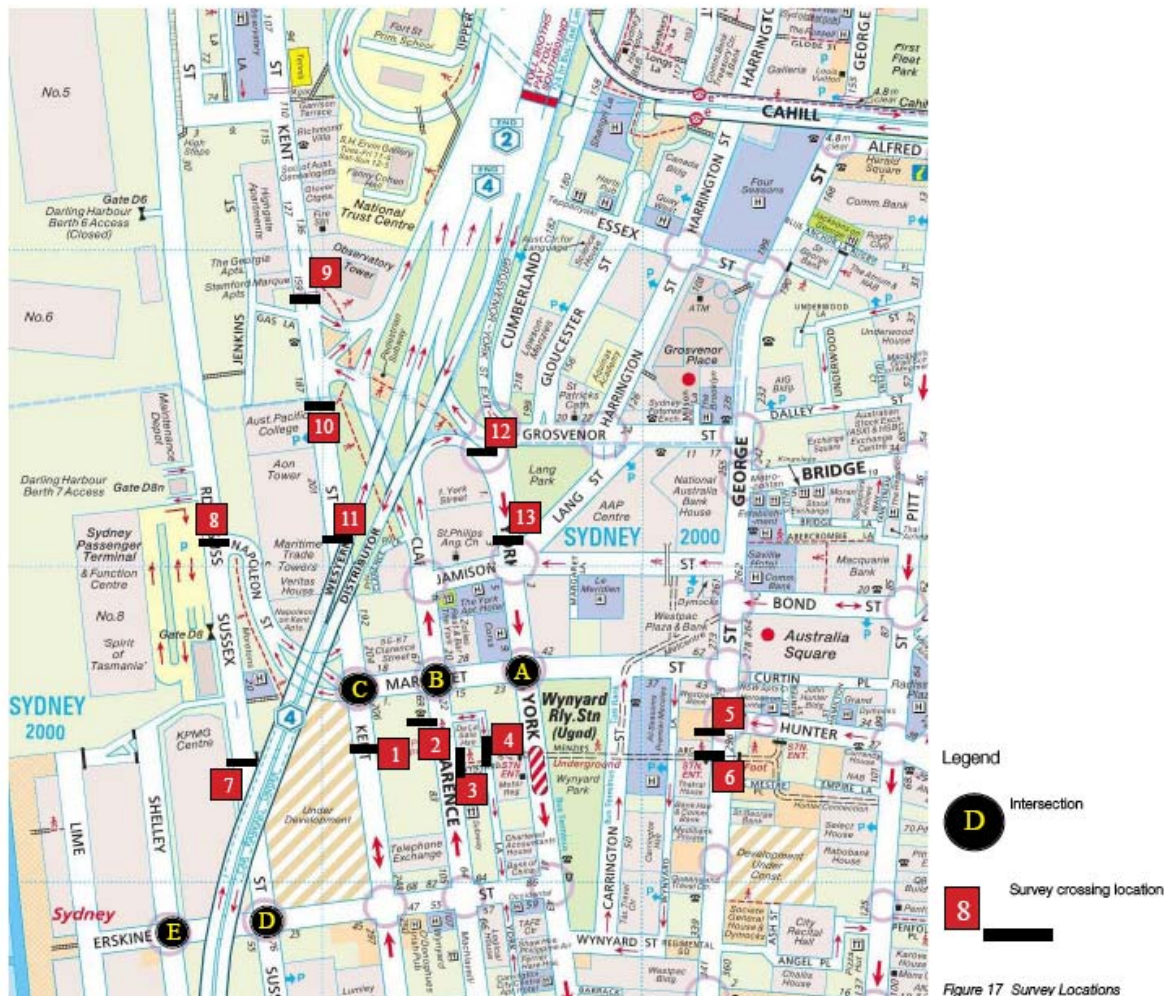


Figure 17 Survey Locations

Source: Extract from Barangaroo Pedestrian Access Report, ARUP, 2007.

Of the locations surveyed intersection A, B and C as well as location 7 and 8 are of primary interest.

At location 7, an average of 11 people per minute were observed crossing the road during the combined morning, evening and lunchtime peak periods. This is a relatively low volume of pedestrians. The report notes that there was a high volume of people crossing away from the traffic signals, due to the presence of a traffic island (supporting the Western Distributor) which allowed a two stage crossing. It is noted that the date of the study was prior to the completion of two new office buildings located near this area, which will likely increase the volume of pedestrians crossing at this location.

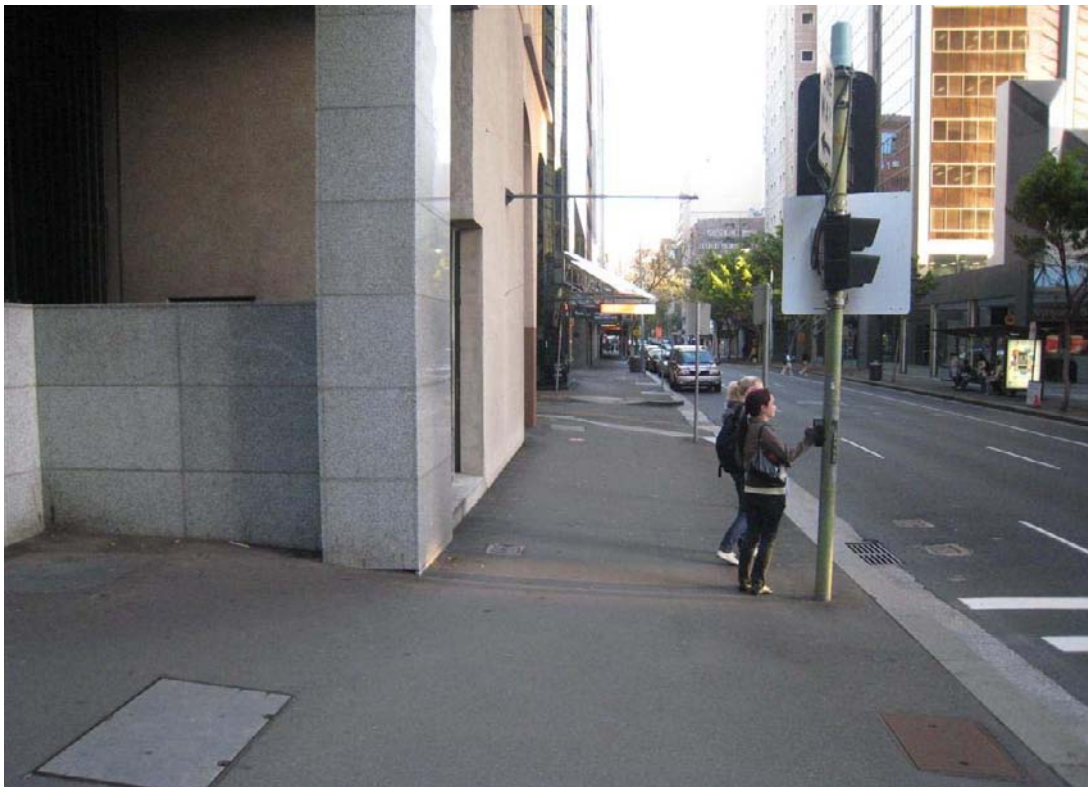
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At location 8, the Hickson Road Napoleon Street intersection, an average of less than 1 person crossed Hickson Road per minute during the combined evening, morning and lunchtime peak periods. This is a comparatively low level of pedestrian activity. It is expected that the Barangaroo redevelopment will increase the volume of pedestrians crossing at this location. The completion and occupation of Barangaroo redevelopment and increased pedestrian generation is not expected to occur until very late in the construction program.

At location A, the York and Margaret Street intersection, an average of 65 people crossed the road (in all directions) every minute during the combined morning, lunchtime and evening peak periods. The midblock volumes on the southern side of Margaret Street have been extrapolated and estimated from the data as being approximately 160 pedestrians in the peak minute (travelling in both directions), which occurred in the AM peak. This is a high volume of pedestrian activity. The average pedestrian flow in the AM peak has been estimated at approximately 45 persons per minute.

At location B, the Clarence and Margaret Street intersection, extrapolation of the survey data indicates that in the vicinity of approximately 60 people pass the Transport House site midblock, per minute in the peak minute. Outside of the peak minute, pedestrian volumes are significantly lower.

**Figure 2.2: Clarence Street eastern footpath looking south towards York Lane Entry, August 2009**



Source SKM-MVA –AECOM 2009

About 700 pedestrians walk north and south along the eastern footpath in Clarence Street in the AM peak hour in the vicinity of the York Lane entry intersection (see figure 2.2). About 75% of the movements are southbound.

On the opposite footpath in Clarence Street total pedestrian movements total about 150 ped/hr. Total mid block movements across the Clarence Street carriageway from east to west totalled about 330 ped/hr in the AM peak hour. PM peak pedestrian movements in Clarence Street are likely to be higher, especially on the western kerb, due to operation of outbound bus stops in the PM period.

The Kent Street tunnel provides pedestrian access between Wynyard Station, Erskine Streets and Kent Street. The tunnel carries a very high volume of pedestrians in the peak period of around 4,500 per hour in the AM.

The underground access point removes the need for pedestrians to negotiate the slope at surface grade on Margaret Street and provide additional capacity to handle pedestrians moving between CityRail and Kent Street office buildings.

**Figure 2.3: Looking north along Clarence Street towards Margaret Street, August 2009**



Source SKM-MVA –AECOM 2009

Pedestrian movements in Margaret Street between Kent and Clarence based on site inspections are lower than the approximately 60 people in the peak minute observed at Transport House. The northern footpath of Margaret Street has a width of approximately 6.5m, with the southern footpath having a width of 3.6m. Existing footpath widths are shown in **Appendix A**. Observations indicate these widths provide spare capacity to handle the current volume of pedestrians travelling in this section of Margaret Street.

This section of Margaret Street has a steep slope, which reduces the amenity of pedestrian movement in this area. The footpath widths indicates that there is scope for footpath narrowing to allow for construction activity, whilst still maintaining an acceptable footpath capacity and accessibility provided minimum widths for DDA compliance are maintained.

An underground pedestrian access link runs to the south of Margaret Street and is the preferred route for the majority of east-west pedestrians who have origins or destinations in or adjacent to Wynyard CityRail station and the Westpac Building in Kent Street. This pedestrian pathway runs from the midblock pedestrian traffic signals south of Margaret Street, to a pop-up on the eastern and western sides of Clarence Street, and then into Wynyard Station at concourse level.

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At the Napoleon Street worksite, there are three pedestrian routes between Kent Street and Sussex Street. There are the steps which run past the southern side of the Moreton Hotel, there is a set of steps and walkways through the park south of Moreton Hotel under the Western Distributor, and additionally and a third access route via the footpath that runs down Napoleon Street to Hickson Road.

Pedestrian movements in and around the York Street/Margaret Street intersection are the most critical, with some scope for adjustment to pedestrian footpaths occurring away from this area.

**Appendix A** shows selected footpath and road widths in the vicinity of construction sites.

### 2.1.2 Bus routes and stops

Wynyard is a major bus and rail interchange. There are a large number of buses which travel to and through the Wynyard Precinct every day, especially during the AM and PM peak periods when the number of buses often leads to congestion and delays buses.

The operation of buses is sensitive due to the magnitude of disruption that can result to a large number of commuter journeys.

The principal bus corridors are:

- Northbound in Clarence Street; heaviest in the PM peak. Clarence Street has a bus lane in the kerbside lane;
- Southbound in York Street, heaviest in the AM and PM peak periods. York Street has a dedicated 24hour bus lane generally in the second lane;
- Westbound in Margaret Street, between Carrington Street and Clarence Street. Buses turn right at Clarence Street to head north onto the Sydney Harbour Bridge. (Buses are permitted to turn against the existing peak hour general traffic right turn ban) and;
- Erskine Street east and westbound between York and Clarence Streets. Northbound buses from Central to the Northern Beaches use Erskine Street between Clarence and York Streets to access the Wynyard bus stops in Carrington Street, prior to continuing to Margaret Street and north over the Sydney Harbour Bridge. Some routes also use Erskine Street after departing stops in York Street, turning right into Clarence Street to travel north back over the Sydney Harbour Bridge. This is a heavy movement particularly in the AM Peak for buses which have terminated in York Street and are returning 'special' to their northern depots.

The major bus stops are in Clarence Street north and south of Margaret Street, in York Street between Margaret Street and Wynyard Street, and in Carrington Street.

**Figure 2.4** shows the locations of STA bus routes and stops in the vicinity of Wynyard.



Bus congestion is often observed in the AM peak southbound in York Street as buses attempt to access the set down kerbs north and south of Margaret Street. This congestion is often related to buses merging and weaving, to access the kerb and then to access Erskine Street to return across the Bridge. Congestion for buses in this section of York Street often also occurs as a result of general traffic delays at the intersections of York and King, and York and Market Streets. This occurs primarily in the AM peak but can also occur in the PM peak.

In the evening peak, bus congestion often occurs in Margaret Street westbound on the approach to Clarence Street due to lack of capacity at the traffic signals, resulting from the allocation of green time against competing north and eastbound traffic movements and the requirement to give way to pedestrians crossing the road in the east-west direction.

Clarence Street has a number of bus routes and is a busy stop in the PM peak period. Bus congestion around the stops between Erskine and Jamison Streets is often experienced in the PM peak period. Sydney Buses, Busways and other coachlines have stops along this section of Clarence Street.

The Sydney Explorer bus service currently utilises Shelly Street with a left turn into Sussex Street from Shelly Street and a bus stop immediately north of the Shelly Street intersection.

The western kerb of York Street is used as a bus layover in the AM and PM peak, with parking/loading restrictions during those times.

**Figure 2.5** below shows the location of bus lanes in the vicinity of Barangaroo-Wynyard Metro Station.

### 2.1.3 Taxis

There is limited provision for taxis or taxi ranks in the immediate area which will be impacted by Barangaroo-Wynyard Station construction activity.

On Sussex Street south of Shelly Street, there is an existing taxi rank which allows for 2 or 3 taxis. Observations and examination of adjacent development show that taxis often double park in an informal rank outside the Macquarie Bank building located on the south west corner of the Sussex/Shelly Street intersection.

There is an existing taxi rank on the eastern side in Carrington Street. However there are no current plans for construction activity in this area.

York, Margaret, Clarence and Kent Streets have a good flow of taxis during business days, with pick up and set down occurring as and when required. It is noted that there are no specific taxi facilities provided, so taxis generally set down or pickup where ever kerb space is provided and if not available, taxis often double park.

Taxis have been observed to utilise the northbound kerbside lane of Kent Street, north of Erskine Street, as an informal rank in the PM peak period taking advantage of fares originating from the Westpac Building. Taxis are also observed on Clarence Street northbound on the approach to Jamison Street in a formal rank arrangement.

The existing International Cruise Terminal at Barangaroo has a high demand and supply of taxis when a ship is due to arrive or depart. Currently taxis are permitted to set down and pick up via the gate in Shelly Street. It is anticipated that relocation of the Cruise Terminal will take place and hence this will no longer be required for Taxi access.

Erskine Street and to some extent Shelly Street also serve as a useful taxi link connection from the entertainment precinct of Darling Harbour to the Sydney Harbour Bridge and other destinations in the City.

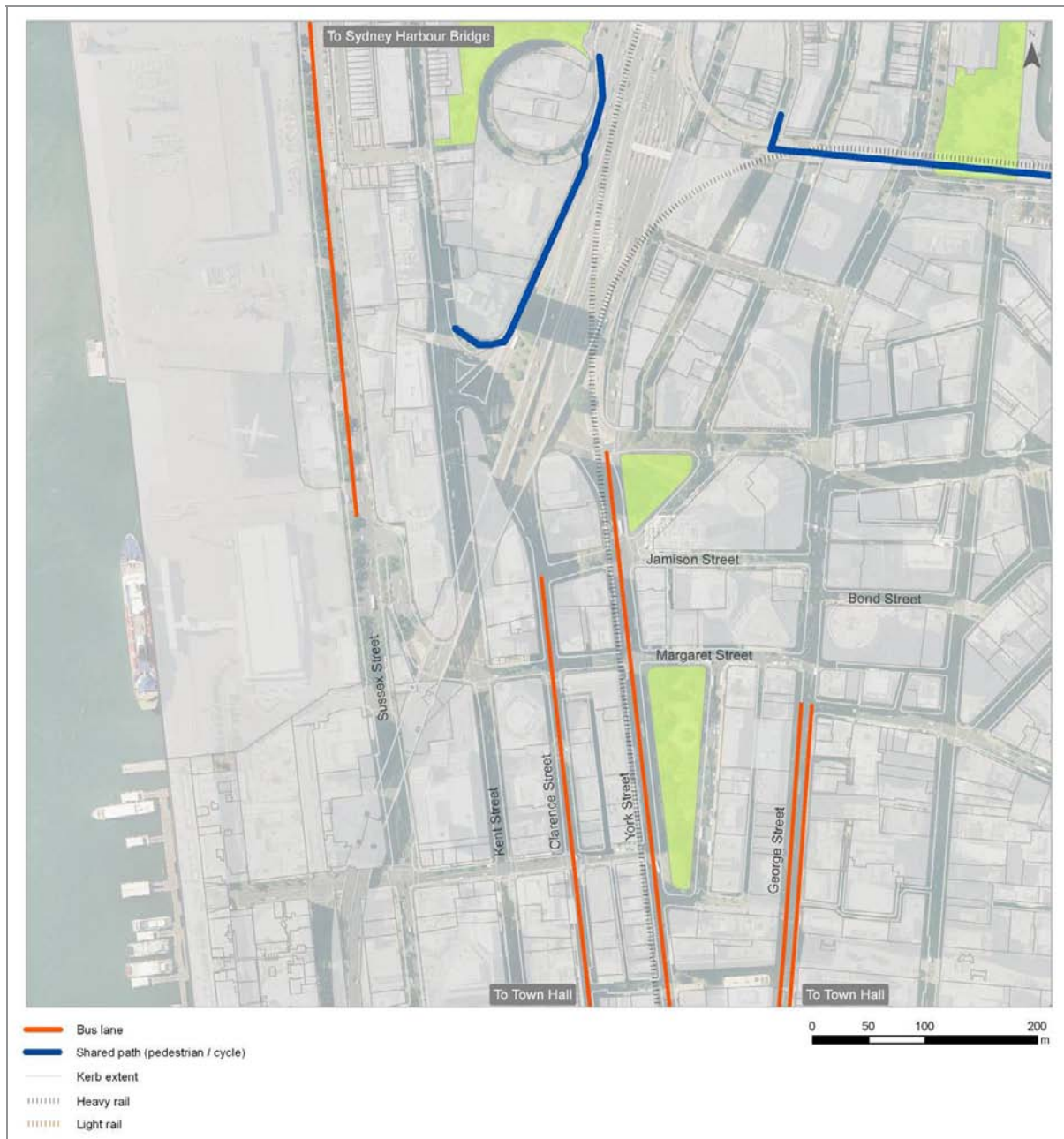
### 2.1.4 Cyclists

The Barangaroo-Wynyard construction site is located near to the approach to the Sydney Harbour Bridge (SHB). The Sydney Harbour Bridge carries a large number of cyclists travelling to and from the North Shore, and these cyclists exit the bridge cycle path at the northern end of Clarence Street as it joins with the SHB approach roads.

This results in a high number of cyclists utilising on road cycle routes on York, Clarence and Kent streets. York Street is one way southbound with Clarence one way northbound. Kent Street carries a high volume of two way cycle movements.

**Figure 2.5** shows the existing cycle routes in the vicinity of Barangaroo-Wynyard Metro Station.

**Figure 2.5: Existing cycle routes in the vicinity of Barangaroo-Wynyard Metro Station**



The City of Sydney has a current proposal to install a dedicated two way cycle lane on the eastern side of Kent Street, which will pass through the proposed worksite at Kent / Margaret Street. The new Kent Street cycle path is planned for construction to commence in 2010.

There is a short section of isolated cycle lane on Sussex Street northbound, on the approach to Shelly Street. This cycle lane does not appear to serve any strategic function. It will be removed during construction period, with cyclists to use the general traffic lane, as they do to the north and south of this isolated installation.

There are no formal cycle parking facilities in the vicinity of the worksites.

### 2.1.5 Parking

Due to the demand to access and service large buildings in this part of the CBD, parking or loading provision is provided on almost all available kerbs in the vicinity of the 3 worksites where the kerbs are not required for traffic capacity. A number of streets and kerbs have peak period parking restrictions to facilitate higher traffic flows during the peak periods. Refer to Appendix B3.

The peak period parking restrictions which facilitate the northbound bus lane on Clarence Street operate between 6am-8pm south of Jamison Street and from 3.00-8.00pm Mon-Fri north of Jamison Street.

The peak period parking restrictions on Erskine Street operate between 7:15 and 9:15 and 16:15 to 18:00, Mon-Fri.

In the vicinity of the York Lane worksite, there are a number of loading zones which have been set aside for RailCorp (although in York Lane is signposted for State Rail Authority personnel). These parking spaces are observed to be used by official visitors or staff to the Station or Transport House building, and use a permit displayed on the dashboard to identify the vehicle.

The Western Side of Clarence Street between Erskine and Margaret Streets is almost all bus lane (6am – 8pm Mon – Fri) while the eastern side is loading zone during the day.

Long stay off-street parking is provided in the International Cruise Terminal and there are several car parks established for passenger and employee parking.

The majority of multi storey buildings in the area have basement car parking. Several of these buildings offer casual parking to the public.

At the York Lane worksite, York Lane provides access to a number of loading docks and parking garages for buildings fronting York Street and Clarence Street. A laneway north of Margaret Street provides access to the York Apartments and Wynyard Vista Hotel as well as a multi storey carpark associated with this development. A Thrifty Car Rental outlet is also located within the Wynyard Hotel with cars stored in the multi storey carpark.

Napoleon Street provides access to Moreton's Hotel and the Serviced Apartments.

**Appendix B** has details of existing parking restrictions in the vicinity of the worksites.

### 2.1.6 Traffic signals

All major intersections in the area are controlled by traffic signals with the exception of the Sussex / Napoleon Street intersection, which currently operates under give way control. All signals are assumed to be linked to the RTA SCATS network which allows dynamic response of the traffic signal timings to adjust to changing traffic flows, as well as remote manual adjustment.

Several signalised intersections of strategic importance to the Sydney CBD are located within close proximity to the worksites or on approach and departure truck routes from the worksites. These include:

- York Street – intersections with Grosvenor, Lang/Jamison, Margaret and Erskine Streets;
- Clarence Street – intersections with Margaret and Erskine Streets;
- Kent Street – intersections with Margaret and Erskine Streets; and
- Sussex Street – intersection with Erskine Street.

### 2.1.7 Other traffic controls

Due to the strong directional demand occurring on the Sydney Harbour Bridge in the AM and PM peak periods, there are tidal flow arrangements in sections of Clarence, York and Grosvenor streets to manage traffic flows according to the demand.

In the AM peak period, access from Clarence Street northbound to the SHB is restricted to bus and taxi only. Vehicles may U-Turn to access York Street southbound, or are otherwise directed into Kent Street, where they may turn either left or right. These arrangements are in place generally between 5.45 and 9:30am Mon-Fri.

Also during this time, traffic from Grosvenor Street is prevented from accessing the SHB, and instead traffic is forced to turn left into York Street southbound. Alternatively motorists in Grosvenor Street may use Lang Street to access York Street southbound. This Grosvenor Street and the Clarence Street arrangement are designed to facilitate additional exit lanes from the SHB southbound onto York Street.

In the AM peak, the Margaret / Kent Street route offers the only egress point from the north western part of the Sydney CBD to the Sydney Harbour Bridge, and so it is an important strategic link.

Outside of the AM peak periods (or other special operational period as required) these arrangements are opened to allow traffic from Grosvenor and Clarence Street to access the SHB northbound directly.

York Lane has several kerb extensions to assist with pedestrian safety and traffic calming. Currently the footpaths along York Lane are very narrow (apx 0.5m) and pedestrians exiting from arcades and the CityRail station have limited opportunity to be seen by motorists travelling in York Lane. The kerb extensions serve to limit vehicle speeds and provide additional footpath space prior to pedestrians stepping on to the roadway.

### 2.1.8 Existing road network

The existing road network is dominated by the Western Distributor and SHB. The arterial routes of Kent Street, York Street, Grosvenor Street and Clarence Street serve primarily as access or departure routes to and from the SHB approaches. These routes are important strategic routes – blockages in routes leading to the SHB, or on the SHB itself, lead to delays spreading quickly throughout the northern part of the CBD. Blockages or delays in York or Grosvenor streets can lead to delays spreading to the SHB southbound, which can have flow on effects in North Sydney and to all southbound motorists on the Bridge corridor.

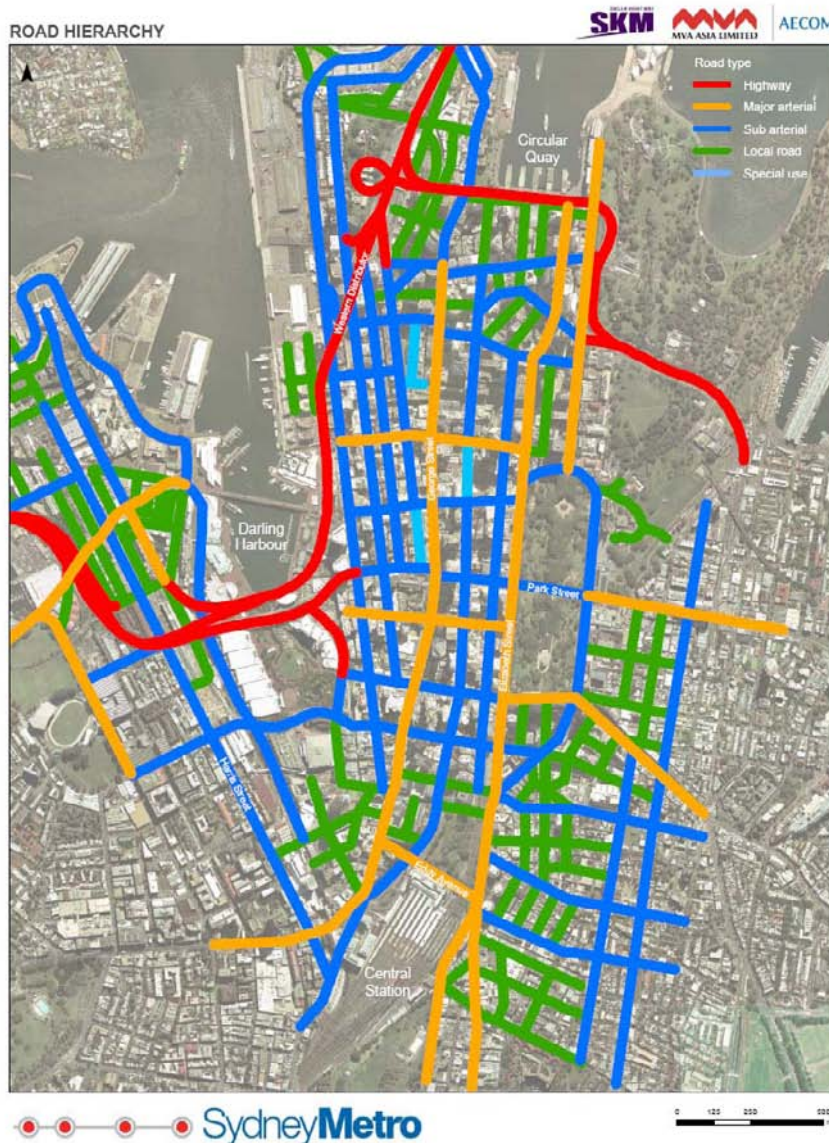
Lower order roads of Sussex Street, Erskine Street, Napoleon Street and Margaret Street all serve as important local access routes, facilitating access between the strategic routes and to provide access to other parts of the CBD.

Local roads of Jamison Street, Lang Street, Carrington and Shelly Street provide local access and also allow operational capacity during incident traffic conditions to help traffic find alternative access through the City.

There are a number of local laneways in the area which provide access to buildings.

Figure 2.6 below shows the hierarchy of the road network within the CBD.

Figure 2.6: CBD Road hierarchy



### 2.1.9 Traffic volumes and turning movements

Traffic volumes and turning count movements have been obtained from the Halcrow MWT traffic model, which was calibrated with traffic data from counts undertaken in December 2007.

It should be noted that traffic volumes in the CBD are seasonal and change throughout the year, as does the time the peak period occurs as well. December in the CBD is reflective of one of the more busy periods during the year, due to the high volume of social events as well as Christmas shopping taking place at the many retail outlets in the CBD.

Traffic volumes and turning movements in the AM and PM peak period from the PARAMICS model are shown in **Figure 2.7** and **Figure 2.8**

Figure 2.7: AM peak period selected flows and turning movements, Barangaroo-Wynyard Metro Station, 2007



**Wynyard-Barangaroo Metro Station - Hourly Flows (8am to 9am)**

TA 2108 Transport and Access Advisor  
 Source: RTA Survey Traffic Movement Survey (Paramics CED Model), 2007  
 Date: Traffic counts undertaken on various days in December, 2007  
 Time: AM Peak (8:00-9:00AM)  
 Plan 1 of 2



NSB - Queensland Street operates as a tidal flow in the AMPM peaks.  
 Two through movements are available for traffic wishing to access York St in the AM peak. These counts have been combined in the diagram in one through movement.

(n) No information

CED Metro\_Wynyard\_Hr\_06

Source: RTA Paramics validation data December 2007

Figure 2.8: PM peak period selected flows and turning movements, Barangaroo-Wynyard Metro Station, 2007

**Wynyard-Barangaroo Metro Station - Hourly Flows (5pm to 6pm)**

TA 2108 Transport and Access Advisor  
 Source: RTA Survey Traffic Movement Survey (Paramics CED Model), 2007  
 Date: Traffic counts undertaken on various days in December 2007  
 Time: PM Peak (17:00-18:00AM)  
 Plan 1 of 2

nil No information

Nil Overcrowd Street operates as a detour in the AM/PM peaks.  
 Two through movements are available for traffic wishing to access  
 York St in the AM peak. These counts have been combined in the  
 diagram as one through movement.



CBD Metro\_Wym and\_Hr\_A5

Source: RTA Paramics validation data December 2007

## 2.2 Other

### 2.2.1 Adjacent developments

There are a large number of important developments adjacent to all Barangaroo-Wynyard worksites. Near the York Lane worksite, the most important adjacent development is the Wynyard CityRail Station and bus interchange. The Wynyard Vista Hotel, York Building and York Apartments to the north of Transport House may be sensitive receivers to construction impacts.

A number of buildings with rear lane access to York Lane have fire escape exits which discharge into York Lane, as well as loading facilities and plant rooms.

Fire stairs also exit in the vicinity of the Clarence Street worksite. A café with outdoor seating is located at the southern end of the Clarence Street site with retail premises on the western end of the site.

At the Napoleon Street worksite, the Serviced Apartments on the north-west corner of the Napoleon / Kent Street intersection are likely to be sensitive receivers. Underground car parking is provided with access from Napoleon Street to this building. The Westpac building located on the south west corner of Kent and Napoleon is a significant pedestrian generator and a key adjacent development for this site. Similarly, the Moreton's Hotel located west of the site is also likely to be a sensitive receiver and is a historic listed building. Deliveries and a loading dock for Moreton's Hotel are located at the rear of the building, with access via a bollard system from Napoleon Street. Moreton's Hotel may also have a residential or short term accommodation component, which may be a sensitive receiver to construction impacts.

The Barangaroo worksite faces the water and is a large site which helps to reduce its impact to adjacent development. However, the newly finished buildings located in Shelly Street to the south of the site are significant. A public carpark is located in the basement of the Leighton's Building in Shelly Street, and construction activity, particularly for the BPL, will be in close proximity to the Macquarie Building. Residential receivers may be located nearby in the north part of the Darling Harbour development. The Barangaroo worksite is owned by the Barangaroo Development Authority, and substantial works are required to relocate the International Cruise Terminal to facilitate the proposed worksite.

### 3.0 Proposed Work Method

The underground stations along the proposed CBD Metro route will be cavern stations with the exception of White Bay station, which will be constructed using cut and cover techniques

Cavern stations are planned at locations where there are depth or land use restrictions for construction of cut and cover stations. Caverns are required to be in competent ground conditions to ensure the large spans required for the stations can be supported.

Cavern stations will primarily be mined with surface structure elements such as entrance, emergency egress and ventilation shafts constructed using cut and cover techniques similar to typical building basement methods.

A primary worksite will be established at the surface to support all stages of cavern station construction and secondary worksites will be required to support shaft construction activities. The site constraints at the surface are considerable with impacts on pedestrian and vehicular traffic for four or more years at each station primary worksite and to a lesser extent at secondary worksites.

Station shafts will be excavated using conventional excavation methods and the caverns will be excavated using roadheaders and rock breakers. It is envisaged that cavern excavation would be completed prior to the arrival of the Tunnel Boring Machines (TBMs) constructing the running tunnels. TBMs will be pulled through the station and prepared for the tunnel drive to the next station. A range of activities will be required at the primary worksite to support this process.

The main truck generating activity will be associated with spoil removal from the excavation of cavern stations, entrance, emergency egress and ventilation shafts, as discussed in Section 4. Other activities that will be supported by truck movements include:

- Enabling works will include building demolition works for property at primary worksites; temporary construction power supply installation; utilities/services relocation or diversion clear of the works and site establishment of station worksites;
- Ground support and lining works for station caverns with plant and material delivered to the underground cavern from the surface;
- Structural concrete works for station entrances, emergency egress and ventilation shafts, followed by internal building works and station architectural fit-out/finishes;
- Specialised installation works associated with station platforms, concourses, accommodation and circulation areas, services and other amenities, station entry/exit gates, platform screen doors and barrier installation.
- Mechanical and electrical fitout of station services and communication systems (including local power supply, lighting, public address, plant room cooling/humidity control; building management systems, smoke exhaust, gas purging, water and waste water, mechanical ventilation, etc.);
- Underground pedestrian concourse areas are to be constructed by combination of mining methods (to minimise disturbance of the road surfaces); and
- Testing and commissioning station systems.

The indicative station construction staging and indicative construction timeframe for the construction activities are summarised in **Table 3.1**.

**Table 3.1: Proposed Construction Activities and Indicative Program**

Construction Staging Activities	Indicative Station Construction Timeframe					
	2010	2011	2012	2013	2014	2015
Enabling & Site Establishment Works	█	█	█			
Shaft & Cavern Excavation		█	█	█		
Ground Support and Cavern Lining			█	█		
Structural Concrete Works				█	█	
Specialised Installation Works					█	█
Mechanical and Electrical Services					█	█
Underground Pedestrian Link Works		█	█	█		
Systems Testing and Commissioning						█

Source: CBD Metro TA2100 July 2009

## 4.0 Worksite Operation and Management

### 4.1 Worksite locations

There are four worksites proposed to enable construction of the Barangaroo-Wynyard Metro Station and the Barangaroo Pedestrian Link Tunnel:

- The primary construction site for the Metro Station cavern excavation and fit out will be located in land adjacent to the existing International Cruise Terminal in Barangaroo and at the intersection of Sussex and Shelly Streets;
- Another worksite will be located on the York Lane site, which covers the area bounded by Clarence Street and the northern corner of York Lane. The worksite would require demolition of the buildings currently occupying number 30 and 32-36 Clarence Street and closure of Kent Street pedestrian tunnel;
- A worksite in Napoleon Street at the intersection of Kent and Margaret Streets to facilitate construction of the Barangaroo Pedestrian Link Tunnel;
- A worksite on the western side of Clarence Street, in the forecourt 'One' building south of Margaret Street.

In addition to the main construction sites identified, other temporary worksites would be required from time to time, as part of the enabling works, PRI works, IMO works and/or other minor works packages. Additional information on these short term worksites is provided in **Section 4.10**

### 4.2 Site access and egress

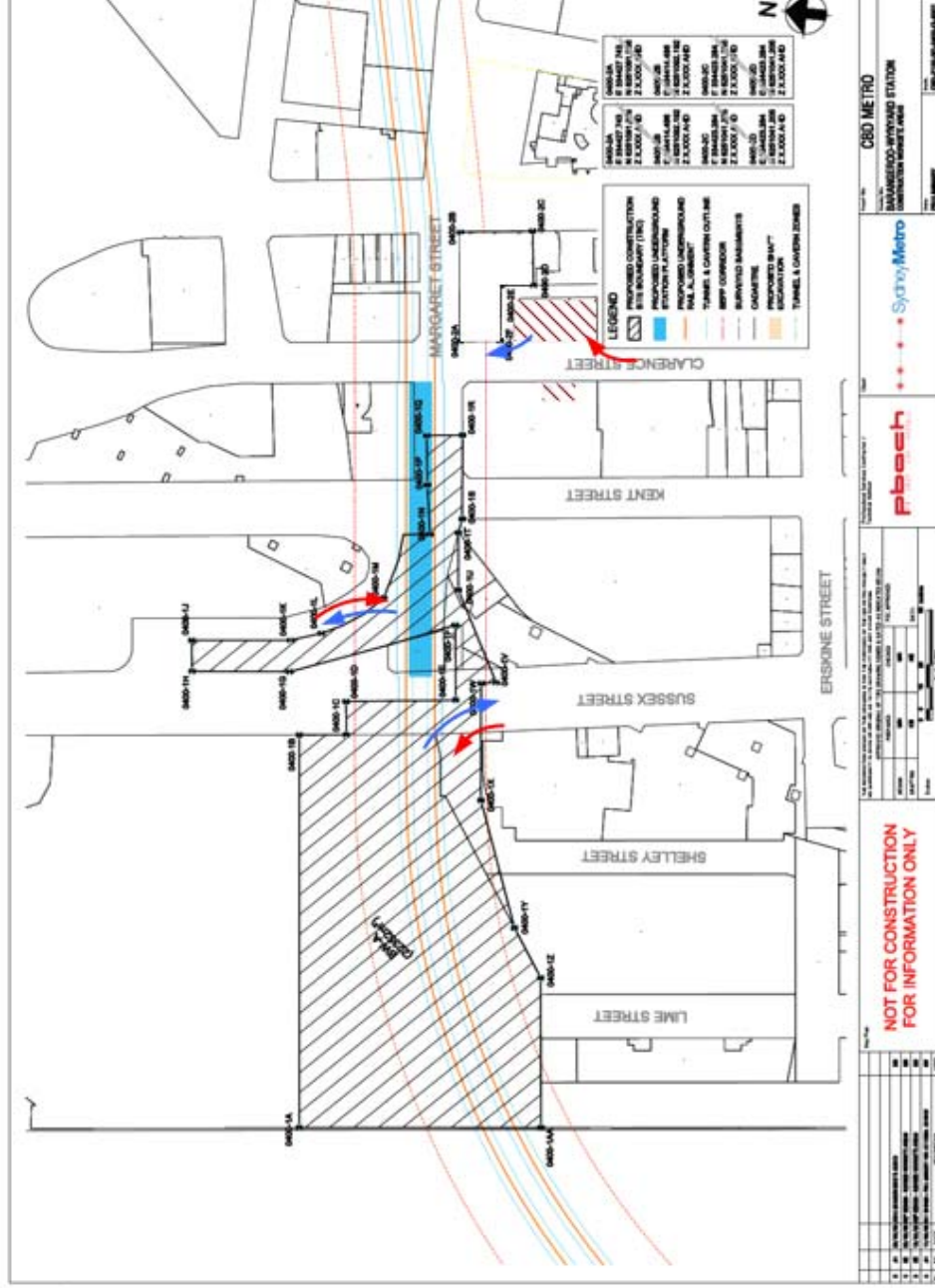
#### 4.2.1 Truck access locations

The following potential truck access and egress points are planned:

- York Lane:  
Entrance via northbound right turn from Clarence Street into worksite. Exit via right turn from site into Clarence Street northbound
- Napoleon Street:  
Entrance via right turn from eastbound on Napoleon into site. Exit via left turn out of site into Napoleon Street westbound.
- Clarence Street  
Entrance via off k left turn from Clarence Street into site  
Exit via left turn back onto Clarence Street northbound
- Barangaroo:  
Two options are available for entrance to the Shelly Street site. Option 1 is for trucks to use Shelly Street northbound with a left turn into site. Option 2 is for trucks to use Sussex Street with a left turn into Shelly and into site. Both exits are via a right turn into Sussex Street.

Entrances and exits are shown on the construction worksite location drawings in **Figure 4.1** below:

Figure 4.1: Barangaroo-Wynyard worksite locations and access



Source: TA2108 overlay onto TA2100 base plan July 2009

## 4.2.2 Approach and departure routes for trucks

There are several different potential truck approach and departure routes. The selection of these routes will depend on the eventual spoil disposal location used, as well as the time of day the truck movements are occurring.

As the level of congestion on the CBD network varies depending on the time of day and peak under consideration, as well as the time of year, the route that trucks take may also require to be varied in order to minimise their impact.

The routes proposed in this Plan are based on traffic engineering judgement as well as knowledge of CBD traffic patterns and existing operational traffic management. These routes may have to be modified during the project if routes do not serve required origins and destinations.

### 4.2.2.1 Barangaroo worksite

Inbound:

Route 1 – Western Distributor to King Street exit, left into Sussex Street, left into Shelly Street and into worksite.

Route 2 – Western Distributor to Bathurst Street exit, left turn into Wheat Road, straight ahead to Shelly Street and into worksite. (Optional)

Outbound:

Route 1 - Right into Sussex Street, southbound on Sussex Street, right onto Market Street viaduct and Western Distributor.

### 4.2.2.2 Napoleon St worksite

Inbound:

Route 1 – Western Distributor to King Street exit, left into Sussex Street, right into Napoleon Street and Worksite.

Outbound:

Route 1 – left out of worksite into Napoleon Street, left at Sussex Street/ Hickson Road, southbound on Sussex and right into Market Street viaduct and Western Distributor

### 4.2.2.3 York Lane worksite

The sensitivity of streets around the bus interchange at Wynyard to traffic congestion as well as the tidal flow arrangements at Clarence Street influence several of the route options around Transport House. The traffic routes used for York Lane worksite will be the same as for **Clarence Street worksite**.

Inbound:

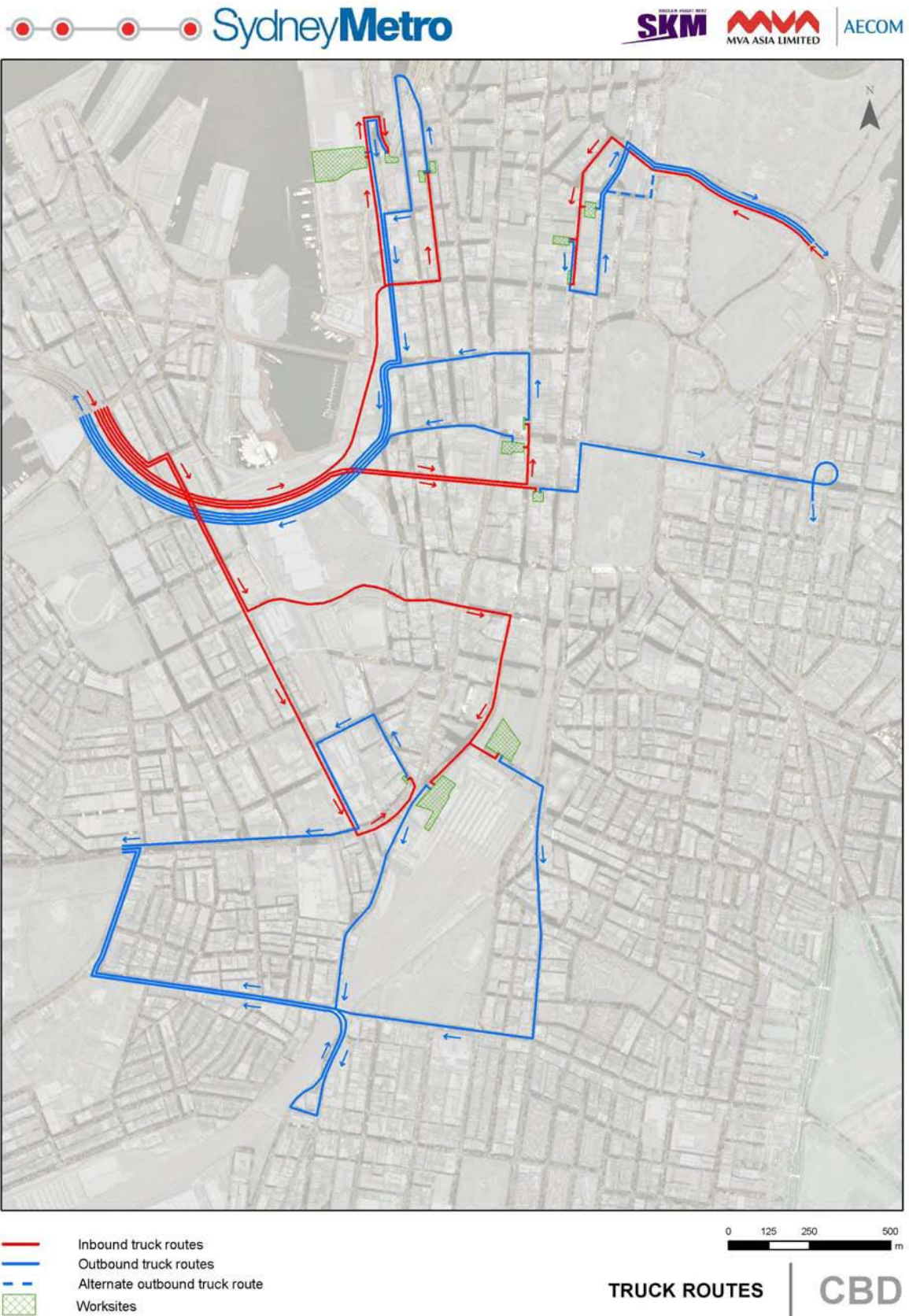
Route 1 – Right out at site into Clarence Street, right into Margaret Street, right into York Street, right into Erskine Street, left into Sussex Street and right into Market street viaduct / Western Distributer.

Outbound:

Route 1 – Right out of site, left at Kent Street, right at Erskine Street, left at Sussex Street and right into Market Street Viaduct / Western Distributor.

The routes are detailed in **Figure 4.2:** below:

Figure 4.2: Construction Routes for Barangaroo-Wynyard Station within the CBD



### 4.2.3 Truck manoeuvring requirements

It is assumed that the concertina gates to prevent pedestrians crossing the site access driveways would operate in parallel with the outside edge of the hoarding. The wider the driveway (and separation of concertina gates), the less width is required on Napoleon, Sussex or Clarence streets to allow a truck to turn.

In order to assess the requirement, AUTOTRACK turning path simulation was undertaken to assess the accessibility of 10.5m truck sizes.

At the York Lane worksite, trucks will be turning from lane 3 of 4 lanes, with the fourth lane being permanent parking/loading. The constraints imposed by adjoining building loading facilities within York Lane and the proposed worksite boundaries (Noise Shed) are issues which are yet to be resolved. Trucks exiting the worksite are likely to require traffic control to assist them to depart from the site safely due to the expected restricted visibility from truck drivers to traffic in Clarence Street.

Napoleon Street is 4 lanes wide at the point of the site access. Appropriate design of the site entrance gate should ensure sufficient width for a truck to turn into the site from the remaining eastbound lane of Napoleon Street. An appropriate access treatment may be to utilise the two eastbound lanes of Napoleon Street to provide a dedicated right turn lane into the site, subject to detailed design and potential loss of parking in Napoleon Street.

Egressing trucks from the Napoleon Street worksite are anticipated to exiting the site in a single lane of westbound traffic via a left turn, or alternatively driving forwards out of the site into the original two westbound lanes of Napoleon Street and merging with other westbound traffic. It should be possible to design the exit so that trucks can pull into this single lane. However, if the site constraints prevent this, the use of traffic control may be required to assist trucks to turn out of the site.

The Barangaroo worksite has ample space to design appropriate turns into and out of the site and turning paths of trucks is not anticipated to be a concern. The opportunity to provide a roundabout at Hickson/Napoleon Street to facilitate truck U-Turn movements to access the Barangaroo worksite adds flexibility to truck routeing if turn movements are restricted. While a roundabout to provide a U-Turn facility is not currently proposed as part of the current truck routeing, the opportunity to create one does exist if later determined to be required. It is noted that a roundabout may not be an appropriate form of long term traffic control for this intersection following redevelopment of Barangaroo.

At the Clarence Street worksite, only small sized trucks will infrequently access the worksite, and these movements will be during the off peak periods. Trucks will turn left into site and park within the worksite. Trucks may also use the Kent Street Tunnel while it is closed, with access from Kent Street. Details relating to any proposed traffic control to facilitate these movements will be contained in the CTMP's.

### 4.2.4 Access for workers

Access for workers will be via the existing pedestrian footpath network or via a shuttle bus to the site if a shuttle service is offered by the PRI or IMO contractors, perhaps from a dedicated parking facility in White Bay. The Barangaroo worksite will have limited onsite parking for workers.

It is assumed that most workers will arrive via public transport or a shuttle service from the main site at White Bay. Given the high levels of public transport accessibility to the Sydney CBD, and the start/finish times of construction shifts generally not coinciding with the peak periods of office workers, the use of public transport is not anticipated to be a significant issue.

#### 4.2.5 On site parking

The limited worksite areas available at the Napoleon Street and York Lane worksites will preclude the provision of on-site parking for workers. However, there is potential for parking to be provided on the Barangaroo, White Bay or Rozelle Depot worksites with transfers via scheduled bus services or dedicated shuttle bus. The need for this facility is diminished by the good public transport accessibility of the CBD. The limited amount of parking proposed to be provided at the Barangaroo worksite may facilitate workers walking to the Napoleon and York Lane sites via the existing footpath network.

There may be the potential for limited on site worker parking, i.e. for the foreman or engineer, which may account for one or two vehicles at the Napoleon Street or York Lane worksites. The physical restrictions of the site boundary limit any further vehicle parking on the sites.

Access to worksites for materials and equipment required by tradesmen during the fit-out phase may be limited, either by site size constraints or concurrent activities. Consideration will be given to storing materials and equipment remotely at White Bay or the Barangaroo worksite, and transferring to site when needed.

### 4.3 Management of site access

#### 4.3.1 Site security

The worksites will be completely hoarded off to provide public safety and site security. The Barangaroo worksite will be fenced off. The York Lane and part of the Barangaroo worksite are anticipated to have a noise shed constructed in order to minimise disturbance from construction activity to adjoining sensitive receivers.

The Clarence Street worksite boundary requires the use of the footpath on the eastern side of Clarence Street to be closed for a temporary period. The temporary full closure of this footpath will require a road occupancy to provide for pedestrian movement in the existing easternmost lane of Clarence Street. This will require suspension of existing loading / off peak parking for the duration of the road occupancy. Care in the design and operation of the temporary pedestrian diversion will be required to manage the need for construction vehicles to pass into and out of the worksite, and for general vehicles to be able to turn into an out of York Lane.

Additional details on how this temporary footpath closure may be managed outlined in **Section 5.3**. Following the temporary stage of work which requires this footpath to be closed, it will be re-opened to pedestrian access underneath a gantry style hoarding.

#### 4.3.2 Truck access

The worksite location at York Lane will require trucks to cross relatively busy CBD footpaths. At all times between the hours of 7am-7pm Mon-Fri, management of the driveway access to reduce potential conflicts between pedestrians and trucks is proposed. Management of truck egress and general public vehicle access to York Lane may also be required. A review during operation will be undertaken to see if this period needs to be extended. Pedestrian control would take the form of concertina gates manned by traffic controllers to stop pedestrian movement on the footpath and deter pedestrians from using the roadway during the period immediately before, during and after a truck is crossing the footpath.

At other times, truck drivers are able to enter and exit observing normal requirements to give way to pedestrians when crossing footpaths. Trucks will enter the worksite and exit in a forward direction. If short term construction periods or temporary works are required where trucks are required to reverse into or out of a worksite, they will be accompanied by sufficient traffic control to control both pedestrian and vehicular movements. These truck movements will be subject to the corresponding restriction of hours for use of traffic controllers.

## 4.4 Management of pedestrians at worksites

Pedestrians will be stopped by Authorised Traffic Controllers and concertina gates used between the hours of 7am-7pm Mon-Fri, whenever a truck is crossing the footpath. Additional times for traffic control of pedestrian movements will be evaluated for periods such as Thursday late night shopping, Friday and Saturday night entertainment, or special events.

Pedestrians will be protected by hoardings when using footpaths adjacent to the worksites.

Where gantry hoardings are used (i.e. York Lane), lighting will be provided to ensure a safe pedestrian environment.

At all sites a minimum clear width of 2.1m for pedestrian footpaths will be maintained at all times. This width ensures that a two wheel chair users, or a wheel chair and a pram, can pass side by side. If any footpath width is proposed to be restricted to 2.1m, it will be clear of any other street furniture.

The York Lane worksite may require the temporary closure of the eastern side footpath of Clarence Street between Erskine and Margaret streets. Signage will be erected to inform pedestrians to cross to the other side of Clarence Street to travel north or south if the footpath is closed. An interim period after the closure of the footpath is put into place may require the use of traffic controllers to advise and encourage pedestrians to cross to the western side of the road to travel north or south.

There is also likely to be the need for a temporary closure of the western footpath in Clarence Street at the Clarence Street worksite.

No restriction to the storage width at the signalised pedestrian crossings at Margaret and York, or Margaret and Clarence, is proposed due to the additional room that will be required at these locations to enable pedestrians to cross to the northern side of the road.

The Napoleon Street worksite will require pedestrian access to be managed on the Westpac Park side of the worksite and the steps to Sussex Street. No pedestrian access will be maintained on the northern side of the worksite bordering with Napoleon Street. Pedestrians may use the northern footpath of Napoleon Street, or travel via Sussex Street.

York Lane worksite will require the closure of the Kent Street pedestrian tunnel on an ongoing basis. In addition, it will be required to close sections of York Lane for cut and cover activity. These two activities are likely to result in significant pedestrian detour routes via the surface street network to provide capacity for between 4,000 and 5,000 pedestrians in the AM peak hour. The management measures to mitigate against this detour routes will be determined in the CTMP.

## 4.5 Hours of work

Standard NSW construction hours are 7.00am to 6.00pm on weekdays and 8.00am to 1.00pm on Saturdays. While some of the construction work would be undertaken within these standard construction hours, the majority of the works would need to be undertaken on a 24 hour six day week basis. The proposed construction hours for the below-ground and above-ground activities are outlined below in **Table 4.1**. In exceptional cases of urgency it may be necessary to depart from these assumed hours. This would not take place without prior discussion with and/or notification of local residents and the department of Environment and Climate Change.

**Table 4.1: Table 4.1: Expected hours of work**

Activity	Construction Hours	Comment/expectations
<b>Below-ground construction activities</b>		
Tunnelling	24 hours per day, six days per week	<ul style="list-style-type: none"> <li>■ Some activities that support tunnelling and fitout works may need to occur 24 hours per day, seven days per week</li> <li>■ Rock hammering in the tunnel between 10.00pm and 7.00am</li> </ul>

Activity	Construction Hours	Comment/expectations
		is likely to be precluded where it may impact on residential receivers
Construction of station caverns	As above	
<b>Above-ground construction activities</b>		
Construction Sites	Standard DECC construction hours	<p>The following activities would be undertaken 24 hours per day, six days per week where noise impact management measures have been established:</p> <ul style="list-style-type: none"> <li>Surface works supporting underground construction (e.g. concrete pumping, truck loading)</li> <li>Excavation in hard ground</li> </ul> <p>Non-disruptive preparatory work, repairs or maintenance may be carried out on Saturday afternoons or Sundays between 8am and 5pm.</p> <p>Activities requiring temporary possession of roads may need to be undertaken outside the assumed hours to minimise safety impacts and inconvenience to commuters. Similarly, works involving utilities would need to be undertaken during periods of low demand likely to be outside of standard hours.</p>
Construction Traffic	24hours per day, 7 days per week	<ul style="list-style-type: none"> <li>Spoil trucking operations are likely to occur between 7am to 10pm, seven days per week. Spoil trucking from the White Bay worksite will take place 24hours per day, 7 days per week.</li> <li>At locations where sensitive noise receptors are close to construction sites, significant construction vehicle movements are likely to be restricted during evening and night-time periods.</li> <li>Extended periods of localised lane and road closures would likely be required for safety purposes for the demolition of multi-storey buildings.</li> </ul>

#### 4.6 Truck movements associated with spoil excavation

The removal of excavated spoil is anticipated to generate the maximum number of truck movements from the worksites and represents the worst ongoing case of all construction periods. There may be short periods where the disruption to existing traffic arrangements and travel patterns is greater, for example during the site establishment of the demolition phase when trucks may not be able to access the site, however this period will be short compared to the overall construction program. Traffic management measures to be put in place for these temporary periods will be covered in the CTMP's.

Barangaroo-Wynyard worksites where demolition is required (York Lane, Clarence Street and Barangaroo worksites) have adjacent parking and loading areas which are out of the traffic stream (on Clarence Street southbound and off street in Barangaroo). These areas can be utilised for works zones/off peak works zones to enable heavy vehicles to service the worksites during the enabling phases. As such, the demolition / site establishment phases are not anticipated to represent a significantly worse traffic impact than the ongoing spoil removal phase.

For the purpose of trip generation, trucks are assumed to have capacity to carry 5m<sup>3</sup> of unbroken rock at all Barangaroo-Wynyard worksites. This provides a conservative estimate for traffic generation at the Barangaroo worksite, where the use of larger trucks including articulated or truck and dog is being considered.

Notwithstanding spoil production rates, the limited site area available at the Napoleon Street and York Lane worksites precludes more than one truck being able to access the site at any one time. The minimum time taken for a truck to enter the site, be loaded from the stockpile and exit is estimated at some 5 minutes, yielding a physical limitation of the number of trucks per hour able to access the smaller worksite to 12 trucks, or 24 two way trips per hour.

The rate of production at the smaller worksites is expected to be significantly less than the volume of trucks which the site can service, and as a result, the truck servicing method of determining truck volumes is considered to be a maximum upper limit.

For the ongoing worst case period of spoil excavation, Table 4.2 summarises the maximum number of truck movements per day, based on the average spoil production per day and removal by single unit dump trucks. These figures have been estimated based on the maximum daily production rates advised from TA2100 on 27/7/09, and may be subject to revision once a more detailed construction methodology and program is developed. It should be noted that maximum daily production rates refer to the ability of equipment to produce spoil. The maximum daily production rates may not be achieved if shift times are shortened due to the program of this station not being on the critical path for TBM arrival. Not all worksites will be operating concurrently.

**Table 4.2: Summary of Excavated Spoil Quantities and Associated Number of Trucks per day**

Worksite Location	Activity	Excavation (m <sup>3</sup> )	Average Production (m <sup>3</sup> per day)	Daily Truck Movements <sup>1</sup> (two way trips per day)	Average Truck Movements <sup>2</sup> (two way trips per hour)	Maximum Truck Movements <sup>3</sup> (two way trips per hour)
Barangaroo	Cut and Cover, Shaft, Mined Tunnels	Soft:24,360	386	136	9	24
		Rock:7,310	68	28	2	
	Cavern <sup>4</sup>	Rock: 53,800	334	134	10	
York Lane (estimated)	Shaft, Mined Tunnel	Soft:12,540	193	78	6	24
		Rock: 35,750	204	82	6	
Napoleon Street	Cut and Cover, Mined Tunnel	Soft:2,000	97	40	3	24
		Rock: 12,334	164	66	5	
Subtotal Rock <sup>5</sup>		109,194	702	282	21	
Subtotal Soft <sup>5</sup>		38,900	676	496	18	
Total		148,094				

Source: Preliminary estimates of truck movements, CBD Metro TA 2104, 27/ 07/09, based on spoil quantities and production rates as of 17/06/09.

**Note:**

- 1 Number of trucks per day estimated on the basis of 5m<sup>3</sup> per single unit dump truck and each movement generating one inbound and one outbound trip
- 2 Average truck trips per hour, based on 15 hours per day
- 3 Maximum truck trips per hour, based on the maximum throughput of one truck per 5 minutes and two trips per truck.

- 4 The main station cavern excavation takes place via the Barangaroo Worksite.
- 5 Subtotals utilise maximum production rates to give worst case scenario, as different production activities are not concurrent.

#### 4.6.1 Other activities generating truck movements

Structural concrete and steel, plant and equipment, fittings and fixtures, escalators, and other engineering material will be required to be delivered to each of the sites for construction and fit out of the site. It is not possible to accurately determine the volume of truck movements that will access the site for the purpose of making deliveries, and it is likely that this will change over the course of the various stages of construction activity. However the deliveries and associated unloading/placement activity are anticipated to generate lower numbers of daily trucks movements than the peak movements associated with spoil removal.

The capacity of the worksite to enable a truck to enter, load/unload provides an upper limit to the number of trucks which can realistically serve the site. This has been calculated in **Table 4.2** as 12 trucks per hour.

#### 4.7 Parking requirements

No on-site parking for workers or heavy vehicles at either the Napoleon Street or York Lane worksites is proposed other than those trucks actively involved in deliveries or the removal of excavated spoil.

There is anticipated to be some provision for parking of trucks, plant and workers at the Barangaroo worksite. This parking will be accommodated within the confines of the Barangaroo site which will occupy part of the existing International Cruise Terminal and an area in the existing Shelly Street alignment west of Sussex Street.

Site access for parking at Barangaroo will either be via the existing entrances located in Shelly Street or Hickson Road, or via a new entrance located off Hickson Road.

It should be noted that the provision of worker and truck parking onsite is likely to be dependent on the closure of the International Cruise Terminal, because this space is required to facilitate the parking. With the Cruise Terminal out of operation, the parking previously associated with activity the terminal will be replaced by the worker parking, thus reducing the total impact of these vehicle movements on the network.

The Barangaroo worksite may serve as a call forward location for trucks serving the Barangaroo worksite or the other two Wynyard worksites, particularly if suitable on-street facilities in Clarence or Sussex Street cannot be located.

Possible additional call forward locations for the other two Barangaroo-Wynyard worksites need to be identified. It is anticipated that a length of Loading Zone on Clarence Street northbound may be used as a call forward location for the York Lane site, enabling a truck to approach within 1min travel time of the site and assisting in managing the arrival rate of trucks to the site.

## 4.8 Disposal locations and proposed haulage routes

Disposal locations for the excavated spoil have been identified as outline in the Environmental Assessment. Generally the potential spoil disposal locations are in Western Sydney, However the exact locations will be dependent on the type of excavated material and specific sites at the time of construction. This aspect would be detailed in the construction TMP's for individual worksites.

Within the CBD, the access routes to and from the three Barangaroo-Wynyard Metro Station worksites are outlined in **Section 4.2** of this Plan.

The disposal location of demolition material is likely to be different from disposal of spoil, and may require an alternative routing through the CBD. Details of any demolition disposal sites are not currently available and will be determined by the PRI or demolition contractor, with further details of truck routings given in the CTMP's.

## 4.9 Provision for over-dimension vehicles

Procedures for over dimension vehicles to access the site will be required. This may include low loaders transporting construction plant and equipment. The haulage contractor will be responsible for complying with RTA and/or City of Sydney restrictions on access routes and travel times, together with obtaining any prior approvals.

Processes to facilitate over dimension or over mass vehicles are outlined in the FTMP.

## 4.10 Other temporary worksites

In addition to the main construction sites identified, other temporary worksites would be required from time to time, as part of the enabling works, PRI works, IMO works and/or other minor works packages.

The temporary worksites would be short in duration in comparison with the main CBD Metro construction sites. Duration for these worksites would range from less than 24 hours (for overnight delivery of oversized loads to site), to longer durations of up to 12 months (for worksites required for utility diversions, initial stages of building demolition works, and other staged areas to facilitate infrastructure construction).

The size, location and extent of temporary worksites have not been determined at this stage of the project, however the activities would likely be for work items such as:

- Delivery and lifting of large construction equipment, materials, and components of the works (e.g. escalators, lifts, steel or concrete beams/columns, etc) from within the road reserve, that cannot be undertaken from within the main construction sites due to space limitations;
- Removal and lifting of large construction equipment and material (e.g. TBM components at Belmore Park (Central Station), materials from demolition of existing building, etc) that cannot be undertaken from within the main construction sites due to space limitations;
- Pit and duct systems for 11kV construction power supply for all station sites, and 33kV supply at Pymont and Rozelle/Lilyfield;
- Other utility/services connections for construction purposes (e.g. water supply points, connections for telecommunications, etc);
- Construction and permanent depot access connections onto City West Link Road at Lilyfield;
- Pit and duct systems for bulk power supply routes at Central/Surry Hills and Rozelle/Lilyfield;
- Relocation or diversion of existing services/utilities clear of the main CBD Metro construction sites;
- Initial stages of building demolition works where there is no suitable vehicular access within the property boundary;

- Utility/services connections for the CBD Metro infrastructure in the vicinity of stations, and the stabling and maintenance depot (e.g. water supply, sewer, stormwater, power supply, telecommunications, data, etc);
- Other staged temporary areas to facilitate infrastructure construction works;
- Station precinct and stabling and maintenance depot urban domain and finalisation works external to the main worksite locations including minor adjustment/interface with roads; provision of bicycle ways, pedestrian areas and footpaths; hard and soft landscaping; relocation or adjustment to bus stops and taxi ranks; provision of bicycle storage facilities; wayfinding and signage; line marking; exterior lighting; and other urban domain treatment works.

Measures and management processes that would be implemented to minimise impact associated with temporary worksites would include items such as the following:

- Coordination of works to ensure concurrent worksites at any one location do not coincide (for example a water main diversion on one side of the road would not be undertaken at the same time as installing a telecommunications cable pathway on the opposite side of the road);
- Staging of the works to ensure extent of impact is minimised. For example 'rolling' worksites would be used for linear worksites required for utilities. Trenches for utilities within roads would be excavated, pipework/ducts installed, and backfilled in short (easier to manage) sections along the length of the utility works wherever practicable;
- Alternative 'trenchless' construction methods including pipe jacking, auger boring, microtunnelling, pipe ramming, pilot tube, and horizontal directional drilling could be used where space and methods permitted reduces disturbance on the surface;
- Where works in roadways are required to cross through or are in proximity of intersections, or other constrained areas, night works and the use of road plates would be employed to ensure day-time traffic is not impacted;
- The construction contractors would be required to prepare Traffic Control Plans (TCPs) and road occupancy permits for each worksite for approval by the relevant authorities (e.g. RTA and/or Council) prior to the works commencing on site;
- Provision of suitable traffic control and warning devices as detailed in the TCPs such as traffic control personnel, signage, etc;
- Provision of suitable worksite fencing/barricades to ensure safety of the public and the workers. Where works are proposed in or adjacent to the road reserve, vehicular barricades would be used, otherwise chain wire/mesh type fencing would be used around worksites within footpath areas;
- Access and security of temporary worksites would be carefully managed at all times including when no activity is being undertaken within the sites;
- Minimising storage of materials and equipment within temporary worksites;
- Selection of noisy construction equipment and methods (such as jack picks, jack hammers, rockbreakers, concrete cutting, cranes, etc) would include consideration of proposed working hours, duration of works, and proximity of residential and other sensitive receivers;
- Use and management of suitable environmental controls such as cleaning of truck wheels, sweeping or pavements, control of excavated material to prevent mud tracking and dust, silt socks around stormwater inlets, etc;
- Maintaining and coordinating access to adjacent properties, and access for emergency services at all times;
- Undertaking appropriate community notification and liaison prior to and during the works.

## Trenchless construction methods

Trenchless construction methods are an alternative to open trenching. There are different methods depending on the sites specific requirements. Trenchless methods use either steerable or non-steerable equipment. The steerable equipment can provide pipelines at accurate lines and grades, which is essential for certain applications such as gravity flow sewers. Each different method has its advantages and limitations and the selection of the appropriate method is crucial. The various trenchless methods available are pipe jacking, auger boring, microtunnelling, pipe ramming, pilot tube, and horizontal directional drilling. The particular trenchless techniques also vary depending on whether pressure conduits, gravity flow conduits, where and under what facility they are being installed, length of the installation, and the diameter.

### 4.11 Staged construction of Barangaroo Pedestrian Link Tunnel at Kent St

The Barangaroo Pedestrian Link Tunnel (BPL) is proposed to be at a very shallow depth in the vicinity of Kent Street and Napoleon Street. In addition, a length of up to 30m of Margaret Street may also be too shallow for mined construction techniques. Utility diversions in Kent, Napoleon and Margaret Streets will also require temporary works.

The site constraints for construction of the underground pedestrian link dictate the use of alternative construction methodologies which include cut and cover or bridging (pile and deck) techniques for at least some elements of the construction work. This is envisaged to be necessary due to the shallow depth of the crossing not permitting pipe canopy umbrella or mined techniques.

Regardless of whether cut and cover or a decking construction methodology is adopted, it is not possible to avoid the requirement to occupy road space at the Kent / Margaret / Napoleon Street intersection. It is envisaged that this will require a staged construction approach, and require the loss of some lane capacity or traffic movements at the intersection in addition to those created by the establishment of the primary worksite in Napoleon Street.

A short term full closure of Margaret Street and one of the footpaths between Kent and Clarence Street is anticipated to be required for one of the stages of work. During other stages of excavation work, turn bans or restrictions to permissible movements resulting from reconfiguration of the intersection to accommodate construction staging are also likely to be required to facilitate construction worksites. The existing 4 way intersection of Kent, Napoleon and Margaret Streets may be converted into an offset pair of T junctions during stages of work to maximise the number of lanes available to traffic and manage traffic turning movements while the cut and cover activity under Kent Street at Margaret Street is undertaken.

The staged construction requirements for construction of the Barangaroo Pedestrian Link Tunnel are the subject of ongoing work between CBD Metro and the Barangaroo Development Authority. However, it is likely that the full closure of Margaret Street between Kent and Clarence Streets, and the traffic management measures required to facilitate this component of the construction activity, is representative of the worst case traffic scenario.

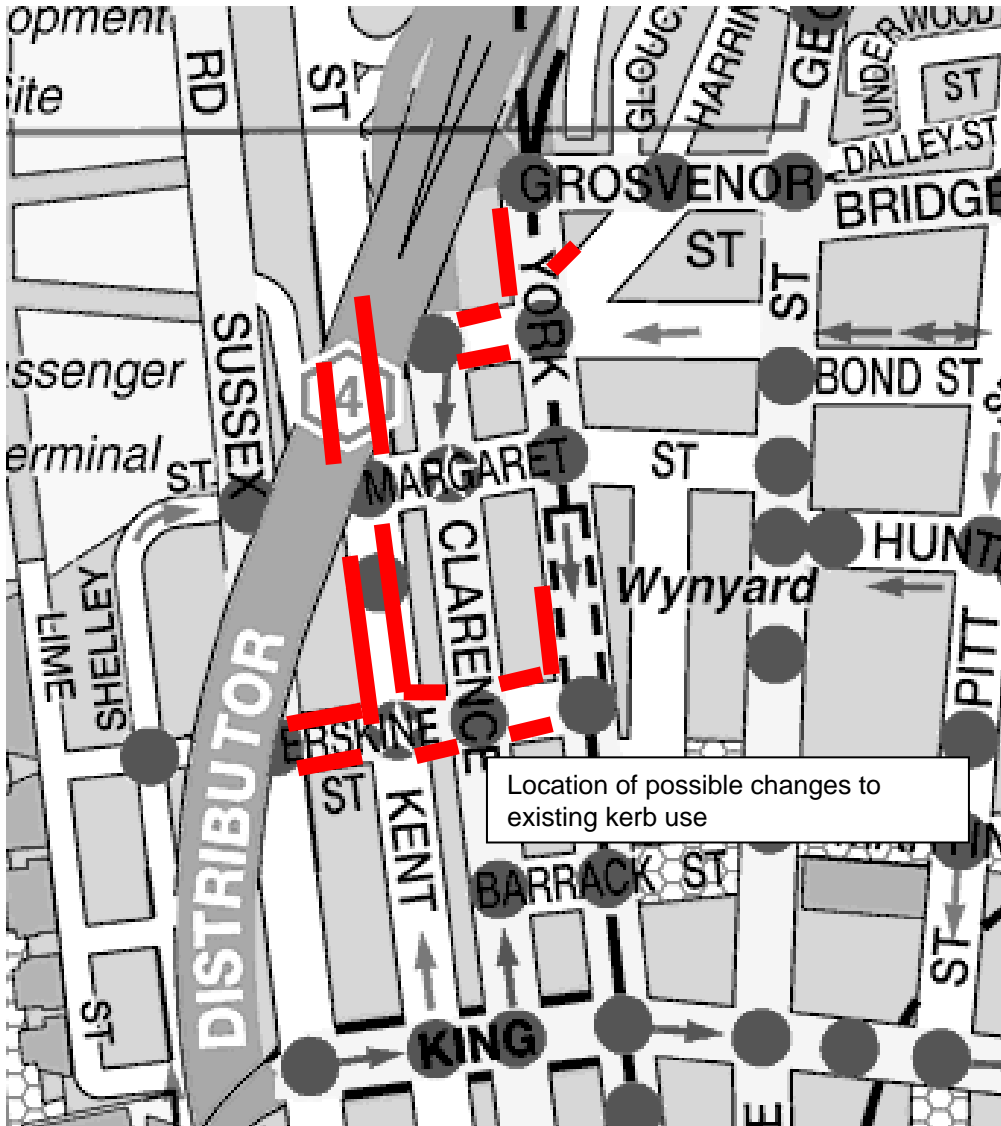
The traffic staging and road closures/turn bans required for BPL staged construction activity will result in traffic diversions. To assist to manage increased traffic volumes on these diversion routes, the removal of on-street parking, loading and other kerbside uses on the alternative routes is anticipated to be required. Locations where kerbside restrictions may have to be introduced or strengthened include:

- Jamison Street, both sides, between York and Clarence Streets
- Lang Street, northern side for an appropriate distance east of York Street;
- York Street, western side on the approach to Erskine and Jamison Streets;
- Erskine Street, both sides, between Clarence and Sussex Streets;
- Kent Street, east side between Margaret and Erskine Streets; and

- Kent Street, both sides, north of Margaret/Napoleon Streets for an appropriate distance.

A diagram showing the potential locations where kerbside activity would be impacted is shown in below.

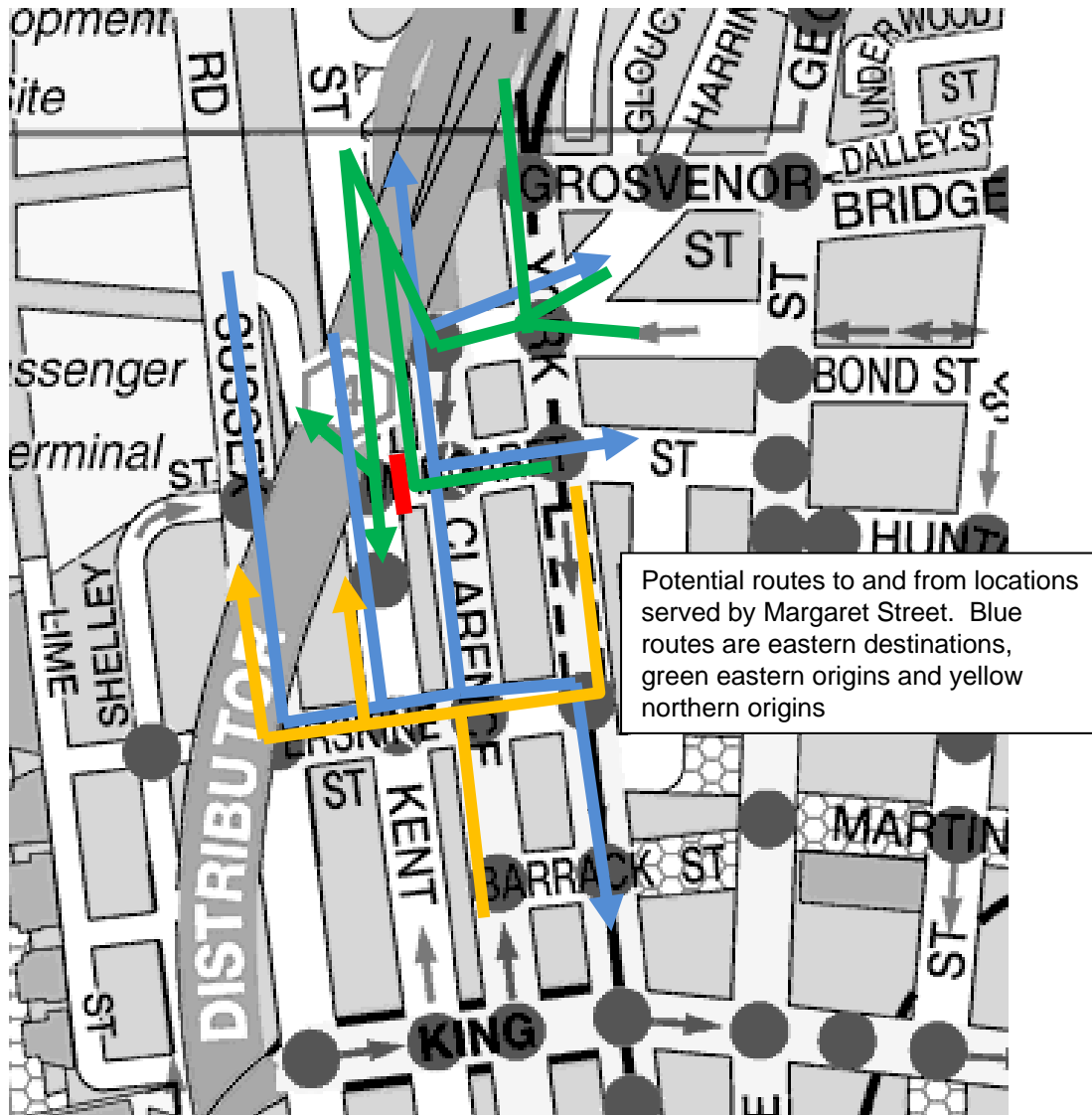
Figure 4.3: Potential modifications to kerbside activity resulting from BPL construction



Source: TA2108

It is assumed that for the worst case traffic scenario of a full closure of Margaret Street, the existing vehicle volumes would be diverted as per the following diversion summary shown in **Figure 4.4** overleaf. Other ongoing BPL construction staging would require similar or less traffic to divert from its desired route.

Figure 4.4: Traffic diversion routes resulting from full closure of Margaret Street between Kent and Clarence.



Source: TA2108 predicted

The impact to bus operations resulting from diverted traffic is potentially significant, especially in the AM and PM peak periods. The areas which are sensitive include:

- Erskine Street eastbound between Clarence and York;
- Clarence Street northbound due to increased traffic on this route between Erskine and Margaret;
- York Street southbound due to the potential requirement to suspend bus standing space on the approach to Erskine Street (the requirement to suspend bus stand space is to facilitate an additional length of right turn lane to cater for increased right turn traffic volume); and
- York Street southbound due to the increased volume of right turn traffic into Jamison Street.

There are several mitigation options available to assist reduce the impact to bus operation. Banning the right turn from Erskine Street into Kent Street, and potentially the right turn from Erskine into Sussex Street, provides a method for dictating diversion route options. The closure of these two right turns would encourage traffic heading south from the Sydney Harbour Bridge to use Jamison Street into Clarence Street and from there into Kent Street to travel around the road closure. This routing avoids traffic having to pass through the sensitive bus area of York Street and may assist to prevent congestion southbound in York Street on the approach to Erskine Street. Delays in York Street on the approach to Erskine Street have the potential to impact significantly on bus operation in the AM peak period and can result in buses queuing across the Sydney Harbour Bridge.

An additional option may be to make Erskine Street bus only between York and Clarence Streets in the AM peak period, requiring southbound general traffic to detour via Barrack Street and hence reducing the attractiveness of this route. This option introduces other traffic implications such as the effectiveness of creating such a closure, impacts resulting from traffic travelling through more intersections than required and turn movements conflicting with pedestrian movements creating delay particularly on Clarence Street northbound and on York Street southbound.

Any scheme to encourage general traffic from using bus sensitive areas would require clear signposting and a comprehensive package of driver advisory information on the alternative routes available.

The westbound closure of Margaret Street will require all Margaret Street traffic to turn right into Clarence Street. If the opposing eastbound lanes of Margaret Street are open to traffic, the green time given to this movement will reduce the volume of right turn vehicles able to clear each cycle which has the potential to impact on bus operations in Margaret, Carrington and York Streets.

Further investigation at the CTMP stage will be required to establish whether the westbound closure of Margaret Street only, compared to the full closure of Margaret Street between Kent and Clarence Streets, may provide a more difficult operational environment for buses. This investigation may recommend Margaret Street is closed preferentially in the eastbound direction over the westbound direction.

The westbound closure of Margaret Street west of Clarence Street will also require removal of the turn ban for general traffic to allow a right turn from Margaret Street westbound into Clarence Street, that currently exists during peak periods. In the mornings, it will also require modifying the tidal flow operation in the vicinity of the Kent/Clarence Street intersection to allow general traffic northbound in Clarence Street to access the Harbour Bridge.

The closure of either the northern or southern Margaret Street footpath between Kent and Clarence Streets is unlikely to result in significant disruption to pedestrian activity. The volumes in this link are low, and there is no active street frontage in the block length. Pedestrians would be required to divert using existing signalised pedestrian crossings to the other side of the street to continue their journeys.

Cut and cover activity in Kent Street is expected to take up to 9 months. However, the staged nature of the construction activity means that Margaret Street closure and traffic diversions may not be in place for the full duration of the activity.

Additional detail relating to the traffic impacts of staged cut and cover activity for construction of the Barangaroo Pedestrian Link tunnel will be provided in the CTMP's.

## 4.12 Closure of Kent Street pedestrian tunnel

The construction of the Barangaroo-Wynyard station will require closure of the Kent Street pedestrian tunnel at the Clarence Street worksite. This will require the re routing of RailCorp patrons via the footpaths of York Street, Clarence Street, and Margaret Street and possibly via York Lane. Specific arrangements for the management of these pedestrians will be detailed within the Construction Traffic Management Plans and the Construction Traffic Control Plans.

## 5.0 Pedestrian and Traffic Management impacts and Mitigation Measures

### 5.1 Primary construction impacts

Primary traffic impacts of construction are anticipated to relate to:

- Temporary relocation of Taxi Zone of 3+ spaces in Sussex Street south of Shelly Street;
- Closure of pedestrian footpaths in Margaret Street between Clarence and Kent streets (potentially both sides, one side at a time);
- Temporary closure of the footpaths on the eastern and western sides of Clarence Streets at the York Lane and Clarence Street worksites;
- Relocation of Sydney Explorer Bus Stop in Sussex Street to an alternate location in Sussex Street;
- Removal of parking/loading – Kent Street, Hickson Road, Sussex Street, Napoleon Street, Margaret Street, and Clarence Street number of spaces to be confirmed;
- Additional potential restrictions in kerbside activity due to BPL construction diverted traffic, including Erskine Street and expansion of parking/loading removals required for other Barangaroo-Wynyard construction activity;
- Removal of loading zones– at least 2 spaces in York Lane and potentially elsewhere in York Street, Clarence Street and Kent Street;
- Removal of Authorised RailCorp parking – 2 spaces in York Lane;
- Staged cut and cover activity in Margaret, Kent, Napoleon, Sussex and Shelly streets with reductions in the number of operational lanes and turn bans
- Temporary full road closures in Shelly Street between Lime and Sussex Street and Margaret Street between Kent and Clarence Street;
- Removal of right turn bay into Sussex Street Macquarie Bank building carpark;
- Diversion of up between 4,000 and 5,000 pedestrians/hr (AM peak hour) due to closure of Kent Street tunnel and York Lane pedestrian arcades; and
- Closure of York Lane potentially resulting in two way traffic working.

### 5.2 Incidents and events

#### 5.2.1 Incidents

Incident response and relevant responsibilities for managing incidents are outlined in the FTMP.

#### 5.2.2 Emergency vehicle access

The potential localised nature of road narrowing in Margaret Street between York and Clarence and between Clarence and Kent, as well as Napoleon, Kent and Sussex Streets adjacent to worksites are not expected to restrict emergency services, especially fire brigade, vehicles from accessing any buildings. The short block lengths and adjacent intersections mean that alternative emergency access points for all buildings should be available.

The location of fire hydrants and access requirements has not been established. These will be identified in the CTMP and appropriate management measures determined if required. Closure of York Lane will restrict emergency vehicle access to the rear of York and Clarence Street buildings between Margaret and Erskine Streets.

Liaison with all adjoining buildings to all Barangaroo-Wynyard worksites will need to take place to ensure these buildings update their emergency evacuation procedures such that the emergency routes do not rely on access or congregation points which have been closed or occupied by Sydney Metro construction activities.

### 5.2.3 Size of emergency vehicles

All lane closures currently envisaged for Barangaroo-Wynyard Station construction should not impact on the size of vehicle which can access the adjoining road network. There will be no restriction on accessibility of emergency vehicles to adjoining buildings, with the exception of York Lane.

### 5.2.4 Special events

Processes for the management of special events are outlined in the FTMP.

It is anticipated that construction processes may have to be varied as a result of the closure of roads or volume of pedestrians / traffic generated by special events and the planning for this activity will take place through the Traffic and Transport Liaison Group (TTLG).

Pedestrian activity in the CBD increases significantly in the lead-up to Christmas and through to the post Christmas sales. This period coincides with an increase in tourist activity, e.g. with summer cruise ship arrivals and generally increased visitor numbers. City of Sydney has a policy of not permitting disruptive works within the retail core during the period from the first week to the end of December. Where feasible, works affecting pedestrian paths and station access should be minimised, and/or increased site supervision by traffic controllers provided.

Increased visitor movements occur within the CBD on Australia Day, around the Mardi Gras and other scheduled marches / parades, that may involve temporary closures on CBD streets, restricted access for private vehicles and altered public transport schedules, and bus layover requirements. Major sporting events on the periphery of the CBD (e.g. Moore Park), generate increase pedestrian and public transport activity. Where practical, construction activities involving truck movements and impacts on CBD streets would be avoided during these times.

## 5.3 Pedestrian management

The York Lane worksite location will require trucks to cross relatively busy CBD footpaths. At all times when trucks will be crossing the footpath, authorised Traffic Controllers will be onsite to manage pedestrian movement to reduce potential conflicts between pedestrians and trucks. This would take the form of concertina gates to stop pedestrian movement on the footpath. Additional pedestrian management infrastructure to deter pedestrians from using the roadway may be required subject to review of the performance of footpath closure devices at the worksite gateways.

Pedestrian management at Barangaroo worksites is not envisaged to be necessary due to the lower volume of pedestrians using this part of the CBD footpath network.

At a minimum, it is proposed that the ramp and steps through the park remain open to allow pedestrian movement between Sussex Street and Kent Street, with the Napoleon Street northern footpath also open to allow movement from Kent Street to Hickson Road to the north.

It is proposed that during construction work, 3.6m wide footpaths will be retained. Where this width cannot be provided, the maximum footpath width will be provided, with a absolute minimum of 2.1m clear of any street furniture or obstruction, will be provided.

At Napoleon Street, pedestrian access from Kent Street will be maintained to the steps leading down to Westpac Park and to the steps which lead to Sussex Street. The footpath which leads to Hickson Road along the southern side of Napoleon Street will be closed.

It is not proposed to reduce the amount of pedestrian storage available at traffic signals. Onsite observations indicate that the existing volume of pedestrians can be accommodated within the minimum acceptable footpath width for accessibility, which is taken as 2.1m. Management measure required for closure of Kent Street pedestrian tunnel and York Lane are to be developed at CTMP stage.

### 5.3.1 Footpath narrowings

Footpath narrowing is anticipated at the following locations:

- Napoleon Street southern access between Kent Street and Westpac Park/Sussex Street;
- Sussex Street western side in the vicinity of Shelly Street;
- Shelly Street southern side; and
- Kent Street in the vicinity of Margaret / Napoleon Street.
- Clarence Street between Erskine and Margaret Street.

Footpath adjustments required at each worksite is covered in Sections below.

#### 5.3.1.1 York Lane worksite

For the York Lane footpaths, some narrowing may be experienced in Clarence Street due to the requirement to provide gantry style hoardings above the footpath and the extent of piling and excavation activity behind the hoarding. The provision of gantry footings on the outer edge of the footpath will result in a loss of footpath width, estimated to be between 0.3m and 0.5m.

The existing footpath width on the Clarence Street frontage is 3.7 (figure 2.2).

Preliminary observations of footpath loading suggest that the proposed reduction in footpath width and potential footpath closure in Clarence Street will still result in acceptable operation for pedestrians. Storage for pedestrians at the intersection of Clarence Street, York Lane and Margaret Street will be maintained as a minimum of a similar level as the existing amount, subject to more detailed assessment in the CTMP. Management of pedestrian impacts arising from closure of Kent Street pedestrian tunnel and York Lane arcades will be addresses in CTMP.

### 5.3.1.2 Napoleon Street worksite

Narrowing of the footpaths in Margaret Street, Napoleon Street and Kent Street will be required in the vicinity of the cut and cover activity under Kent Street, due to the requirement to provide working width for the construction activity as well as the provision of barriers to separate pedestrians from work areas.

The existing footpath widths in Kent Street are approximately 3.6m on the western side and between 8.5 and 9.6m underneath the Westpac building. Margaret Street footpaths are 3.6m on the southern side and 6.75m on the northern side.

The existing pedestrian link tunnel which runs from the Kent Street midblock crossing south of Margaret Street to Wynyard CityRail Station will be un-affected by the works in Napoleon Street, however it will be impacted by works from the York Lane and Clarence Street worksites. This pedestrian link tunnel provides additional capacity to manage pedestrian flows and some local signage to encourage its use may be required if footpath closures result in pedestrian congestion on Margaret or Kent Streets.

A staged approach to footpath closures in Margaret Street may necessitate pedestrians using the northern or southern footpaths while the other one is closed temporarily. Staging between BPL and York Lane construction activities will be required to ensure adequate surface capacity for pedestrians is retained.

The footpath on the southern side of Napoleon Street would be closed which will require access to Hickson Road to be via the northern footpath of Napoleon Street. Alternative access to Sussex Street is available via the Westpac Park stairs/path, or stairs adjacent to Moreton's Hotel.

### 5.3.1.3 Barangaroo worksite

The Barangaroo precinct carries much lower volumes of pedestrians than the other two worksites and as such is expected to have much lower pedestrian impact. Some narrowing of the footpath may result in the vicinity of the Shelly and Sussex Street intersection. However, it is anticipated that all footpaths will remain open.

It may be necessary to close one of the signalised pedestrian crossings across Sussex Street at the Shelly Street intersection during one or more stages of excavation activity.

The existing stairs adjoining the Moreton Hotel may need to be closed during some stages of construction activity. Alternative access between Sussex Street and Kent Street is available via stairs/path through Westpac Park underneath the Western Distributor flyover.

## 5.3.2 Pedestrian capacity

Detailed analysis or modelling of pedestrian capacity due to closed footpaths or restricted width will be undertaken at the CTMP stage for sensitivity and options testing.

## 5.3.3 Provision for vulnerable users (school children, elderly and mobility impaired)

The pedestrian walkways around the York Lane worksite will be maintained with sufficient clear width free of obstruction e.g. due to hoarding footings, posts and trip hazards. In addition, lighting of the walkways for night time security is proposed.

Consideration should be given to tactile pavement marking to guide visually impaired pedestrians around potential obstructions or conflict points.

During temporary staged cut and cover works in Kent, Sussex and Margaret streets, temporary ramps will be provided to facilitate mobility impaired pedestrians to traverse kerbs where permanent kerb laybacks are not provided.

Temporary footpaths will be maintained at a minimum width to allow passage of wheel chair users having regard to minimum footpath widths.

#### 5.3.4 Site access management

Truck movements into York Lane are not expected to be problematic, with trucks being able to turn into the worksite with the protection of parking currently located in Clarence Street. Trucks will turn out of the York Lane site into Clarence Street under traffic control to assist truck driver vision of vehicles in Clarence Street.

Truck turns into the Barangaroo worksite are not anticipated to be problematic, as trucks will be turning from the existing Shelly Street intersection which has sufficient width. It is anticipated that trucks and other construction vehicles will be able to take advantage of the existing traffic signals to execute turns out of Shelly Street to travel southbound on Sussex Street.

Napoleon Street access will be via a right turn into the worksite and is not anticipated to be problematic provided correct design of the entrance gate. Exit from this worksite will be back into Napoleon Street existing westbound lanes and merge with westbound general traffic through appropriate line marking.

### 5.4 Assumptions

The traffic impacts and mitigation strategies presented in this section are based on the following assumptions, exclusions and limitations:

- Pedestrian impacts arising from closure of Kent Street pedestrian tunnel & York Lane arcades have yet to be fully assessed;
- Absolute minimum footpath width required for hoarding footings (300mm);
- Footpaths will be cleared of other street furniture adjacent to hoardings;
- No intrusion of worksite boundaries into the footpath; and
- Enabling or site setup works have not been considered (will need to be considered at CTMP stage).
- Trucks within York Lane worksite will be stopped parallel in Clarence Street.
- Impact of potential short term closure of York Lane to public vehicle access has not been fully assessed.

Additional assumptions and limitations appear in the text of this report in the Sections they relate too.

### 5.5 Servicing

#### Napoleon Street worksite:

A loading facility currently exists at the rear of the Moreton's Hotel in Napoleon Street and access is provided by removable bollards from Napoleon Street. Due to the location of a worksite in this area, it is likely that alternative loading arrangements will be required. It is noted that several cars, potentially related to operation of the Hotel, currently use this loading area to park. These vehicles will require relocation for the duration of construction.

It is possible that the loading and parking area at the rear of the Hotel will not be re-instated in the future state arrangement, or at least the loading configuration would be changed.

It is anticipated that the location of the worksite will not impact on the existing access driveways to Serviced Apartments and other users on the northern side of Napoleon Street.

### York Lane worksite:

The rear lane access to Transport House currently serves loading docks and car parking basements located along York Lane. Due to the one way access arrangements and limited turning room, it is not possible to change access arrangements to these properties and access to or from Clarence Street will be maintained throughout the project.

A call forward location on the eastern side of Clarence Street between Erskine and Margaret streets may require the removal of one or two loading zone spaces. Confirmation that this facility is required and clarification of its exact location has not yet been determined.

Given the lack of available kerb space, it is not proposed to provide additional loading areas to replace those which lost during the construction period.

There would be no change to the existing laneway access on Margaret Street between York and Clarence Street which provides access to the York St Apartments, Hotel and Thrifty Car rentals carpark and loading dock areas.

### Barangaroo worksite:

Relocation of the International Cruise Terminal and other port buildings will limit the changes to servicing in the vicinity of the Barangaroo worksite. There is currently no loading facility in Shelly Street which would be impacted by the creation of the Barangaroo Worksite, with 'No Stopping' restrictions currently in operation in this part of Shelly Street.

Staged cut and cover activity in Sussex Street in the vicinity of Shelly Street is anticipated to impact on the access arrangements to the basement car park located on the south west corner of the Sussex / Shelly Street intersection (Macquarie Bank building). This is expected to involve temporary removal of the dedicated right turn bay which currently caters for southbound access to the driveway. There is not anticipated to be any change to the access, with turns north and southbound in Sussex Street still able to access the driveway, but without the benefit of the southbound right turn bay which may create delays for southbound traffic. A keep clear type line marking arrangement may be required to assist southbound traffic to turn into the development if northbound queuing results from the intersection/pedestrian crossing at Shelly Street and Sussex Street.

## 5.5.1 Provision for adjacent development

Given the extent of proposed change to existing on and off-street servicing facilities outlined above, the following provision for adjacent development is anticipated:

- Modifications to facilitate loading and rear garage access at Moreton's Hotel;
- Liaison with the tenants/property owner of the building located at the south east corner of the York Lane/Clarence Street intersection to determine the nature of use of the Loading Dock located in York Lane;
- Liaison with Macquarie Bank building regarding changes to access to basement carpark;
- Liaison with RailCorp to determine the requirement to retain "Authorised Vehicles Excepted" and "RailCorp Authorised Parking" in the vicinity of Transport House; and
- Liaison with all buildings with driveway access points to York Lane regarding potential adjustments to access into York Lane.

## 5.5.2 Cash in transit

It is important for cash in transit vehicles to be able to retain a high degree of accessibility to pick up points to manage the risk of moving cash. Moreton's Hotel has been identified as possibly requiring a revision of the current cash in transit arrangements. This TMP makes no specific provision for changed access arrangements and it will be the responsibility of the cash in transit companies to determine how best to respond to any change in access arrangements.

## 5.6 Cycle routes and access

Ongoing discussions with City of Sydney officers have been held regarding the interaction between CBD Metro construction activities and the City of Sydney program to install a bi-directional cycle lane in Kent Street. Metro construction is anticipated to result in delay to the City of Sydney program, due to the need to occupy the road space which would otherwise be devoted to the Cycle lane, and the inability to engineer a solution to providing an interim cycle facility on Kent Street because the bi-directional nature of the path will create issues when transitioning northbound cyclists back onto the northbound carriageway.

No other specific provision for management of cyclists is proposed. Cyclists will use general traffic lanes and are expected to fully occupy that lane due to the existing restricted lane widths available in some locations.

There is no intention to replace the short, isolated section of cycle lane on Sussex Street northbound at Shelly Street during the construction phase as this infrastructure does not serve any strategic function for cyclists.

## 5.7 Bus routes and stops

The following strategies will be used to cater for bus routes and stops:

- As there is no change to existing commuter bus stop locations, routes, priority treatments or turning movements, this limits the impact during construction;
- Any bus strategies required to overcome congestion will need to be identified after network modelling results are known;
- The Sydney Explorer bus route may need to be diverted from its current route in Shelly Street. The alternative route would be via Erskine Street into Sussex Street and back onto the line of route;
- The Sydney Explorer bus stop at the International Passenger Terminal in Sussex Street will need to be relocated. Opportunities are available north of the existing stop by removing parking; and
- Some disruption to the route of the Sydney Explorer service may also result if Shelly Street is closed to all traffic during a staged period of construction activity.
- It is unlikely that the Clarence Street worksite will be accessed by trucks to or from Clarence Street between 8-9am and 4-7pm Mon-Fri, or during special events. This will be monitored during early phases of demolition and construction.

## 5.8 Coaches

Currently some tourist coaches use Hickson Road to layover. There is no direct impact to these coaches arising from construction activity as no coach parking bays are impacted by the proposed work in Sussex Street.

There is the potential that coach access on the road network could be delayed or diversions required due to the changes to general traffic arrangements during construction or from the impact of truck operations.

## 5.9 Taxis

There are three main taxi ranks in the vicinity of Barangaroo-Wynyard construction sites. There is a large and busy rank located in Carrington Street (east side), a recently created rank in Shelly Street north of Erskine Street and a rank in Sussex Street southbound south of Shelly Street.

There will be no impact on the Carrington Street taxi rank.

There is anticipated to be significant adjustment to the lane configuration in Sussex Street to facilitate staged construction in Shelly Street. This is likely to require the removal or relocation of the Sussex Street taxi rank. There may be the potential to relocate this rank further south in Sussex Street north of Erskine Street, or alternatively there is the ability to relocate the rank to further north in Sussex Street, on the northern side of Shelly Street by removal of existing timed parking. However, moving the rank to the north side would mean it would be further away from potential sources of passengers including the Macquarie Bank building.

An alternative to relocating the rank is to merge the Sussex Street rank with the new rank in Shelly Street. A further alternative is to remove existing northbound parking in Sussex Street between Erskine Street and Shelly Street and provide a rank in this location. Onsite observations indicate that this area is already a popular spot for taxis to double park while waiting for a fare. It is noted that if a staged construction methodology is adopted and Sussex Street lanes reduced, this double parking practice would need to cease.

The accessibility of the Shelly Street rank, north of Erskine and south of the Barangaroo worksite, would be impacted by the closure of Shelly Street during construction activity. Taxis will be able to access the rank by u-turning or via the road linking Lime Street with Shelly Street.

Additional impacts will result to taxis from general traffic delays as a result of truck movements on the network and adjustments to lanes/road closures resulting from Metro construction. This is expected to occur primarily on York, Margaret, Erskine, Clarence, Kent, Napoleon, Hickson, Sussex and Shelly streets.

Any potential short term closure of Margaret Street for construction of the BPL would impact taxi movements, as per the general traffic arrangements during construction of the pedestrian link tunnel.

Liaison with City of Sydney and the Taxi Council will be required to determine if an alternative facility is required and, if so, where this will be located.

## 5.10 Kiss and Ride

There are no formal Kiss and Ride facilities which are in the vicinity, or impacted on by, the Barangaroo-Wynyard worksite areas. However, informal facilities may exist particularly in the vicinity of Wynyard CityRail Station and the International Cruise Terminal.

Informal pick up and set down activity occurs throughout the CBD on an opportunistic basis. Any opportunities that are closed by CBD Metro construction activity will result in motorists finding alternative opportunities to pick up and set down elsewhere nearby. This impact is not considered significant and no mitigation measures are proposed.

## 5.11 Parking

**Appendix B** contains diagrams showing the existing provision of parking in the vicinity of Barangaroo-Wynyard Station Construction sites:

The following required changes to kerbside parking restrictions have been identified:

- Reduction of parking in Sussex Street south of Shelly Street potentially including existing motorcycle parking;
- Potential removal of parking spaces and relocation of Sydney Explorer Bus Stop on the western kerb of Sussex Street north of Shelly Street;

- Potential short term relocation of the Taxi Zone on Sussex Street eastern kerb south of Shelly Street, resulting in removal of parking elsewhere in Sussex Street;
- Potential removal of some existing loading/parking spaces to create a truck call forward location in Clarence Street (east side) between Erskine and Margaret Streets;
- Removal of parking in Napoleon Street southern side between Kent and Sussex streets to create a worksite;
- Removal of parking/loading bays in Kent Street to enable cut and cover activity in the vicinity of Margaret Street;
- Subject to further detailed assessment the potential removal of all kerbside parking/loading/bus stand activity during the period of Barangaroo Pedestrian Link Margaret Street closure on:
  - Erskine Street between York and Sussex Streets;
  - Kent Street from north of Margaret to Erskine Street;
  - York Street west side southbound on approach to Erskine and Jamison Streets; Jamison Street both sides between York and Clarence Streets; and
  - Lang Road north side extending east from York St intersection;
- Removal of Authorised Vehicle parking in York Lane at the rear of Transport House;
- Removal of Loading Zone in York Lane at the rear of Transport House; and
- Removal of off-peak parking in Margaret Street between Clarence and Kent streets.
- Removal of loading and off peak parking in Clarence Street, south of Margaret Street.

Given the competition for kerb space around the work sites and existing traffic flows, it is not possible to provide additional spaces to replace the parking or loading zones that are required for construction activities. This will result in an increase in competition for the remaining spaces. Prioritisation should be made to the replacement of loading zones over parking spaces, in consultation with City of Sydney.

The requirement to remove all parking and loading activity on the northern side of Erskine Street between Kent and Clarence Streets results from the operational need to accommodate additional traffic including primarily left turn vehicles, which are displaced during the potential period of full closure of Margaret Street between Kent and Clarence Streets.

Liaison with Transport House tenants including RailCorp at the CTMP stage will be required to determine the need to retain authorised vehicle parking in the vicinity of Transport House. Retaining these spaces will require further restrictions placed on other loading zones, most likely in Clarence Street or further south in York Street.

Due to the increased competition for loading space and the dynamic response that the majority of on street loading can make to changes in the available kerb space, a further detailed examination of provision of loading in the adjoining areas will be made during the CTMP process. This may recommend reducing the duration of loading time provided to increase turn-over of spaces, or the conversion of timed parking in Kent, Napoleon, Sussex or other streets to loading spaces to improve parking turnover.

## 5.12 Traffic

### 5.12.1 Vehicle speeds

The existing speed limit on all streets in the vicinity of worksites is 50km/hr.

Depending on the geometry of the staged construction activity in Kent, Margaret and Sussex Street, this may necessitate a reduction in the speed limits in these streets. If required, these reductions will be required on a full time basis for the duration of the activity.

Short term road occupancies may also require a temporary reduction in speed limits while workers are onsite.

All changes to speed limit will be undertaken in accordance with the process outlined in the FTMP.

### 5.12.2 Road network changes

Napoleon Street will remain open to two way traffic, with a minimum of one lane in each direction. This will result in a reduction from the existing two lane operation, particularly for the eastbound direction.

York Lane will remain open to local traffic to access loading and car parking uses adjoining the laneway. The method of access and whether the one way direction of operation is retained as per the existing direction or reversed, or a two way cul-de-sac operation adopted, will be detailed in the CTMP.

It is anticipated that Kent and Sussex Streets would remain in two way operation adjacent to the worksites throughout the construction period with a minimum of one lane in each direction.

The potential full closure of Margaret Street between Kent and Clarence Streets for a short term period is likely to result in a number of road changes. The closure will require removal of the ban for general traffic to allow a right turn from Margaret Street westbound into Clarence Street during peak periods. In the mornings, it will also require modifying the tidal flow operation in the vicinity of the Kent/Clarence Street intersection to allow general traffic northbound in Clarence Street to access the Harbour Bridge. It may also result in the Napoleon Street intersection with Kent Street being pushed to the north to create an offset pair of T junctions rather than the existing 4 way cross street with Margaret Street.

The staged cut and cover activity in Kent Street at the Margaret and Napoleon Street intersection is likely to result in turn bans and restricted movements at the intersection.

### 5.12.3 Intersection operation

PARAMICS modelling of the CBD is being undertaken and the results of which will be discussed with relevant agencies.

### 5.12.4 Impact of construction traffic on frontage roads

The forecast truck movements relative to the existing flows on frontage roads are presented in **Table 5.1**.

**Table 5.1: Summary of Increased Traffic on Frontage Roads due to Construction in the vicinity of Barangaroo-Wynyard Metro Station:**

Site/ Frontage Road	Existing vehicle volumes			Additional truck movements		
	Average Daily Flow <sup>1</sup>	AM Peak Hour	PM Peak Hour	Average Daily Flow	AM Peak Hour	PM Peak Hour
Clarence Street NB North of Margaret St	8,900	620	1140	41	5	5
Increase (%)				0.5%	0.8%	0.4%
Sussex Street North of King St	5,900	410	960	241	18	18
Increase (%)				4.1%	4.4%	1.9%
Erskine Street East of Sussex St	9,600	670	730	41	4	4
Increase (%)				0.4%	0.6%	0.5%
Napoleon Street West of Kent St	13,700	960	680	66	5	5
Increase (%)				0.5%	0.5%	0.7%
King Street EB East of Sussex St	18,600	1300	830	41	5	5
Increase (%)				0.2%	0.4%	0.6%

Source: CBD Metro TA2108, July 2009

Note:

- 1 Average daily flow is an indicative estimate only, based on the assumption that AM Peak hour flow represents 7% of the average daily flow for CBD streets.

With the exception of Sussex Street, the increased traffic flows resulting from construction traffic amount to less than 1%. Sussex Street has up to a 4% increase in traffic resulting from construction activity.

### 5.13 Project impacts and sensitivities

The construction timeframe for the CBD Metro project is planned with consistent rates of spoil removal, based on average daily and hourly throughputs. For the smaller work sites, such as York Lane and Napoleon Street, there is very limited site area available for spoil storage, so the efficiency of the site relies on the ability to remove spoil, ahead of the excavation capability / storage capacity.

Any factor which causes an unplanned delay to the rate of spoil removal will have effects on the quantity stored on site and ultimately on the rate of progress of the work. There is limited opportunity to increase the rate of truck arrivals at the site to clear a backlog, due to the time required to enter, load and depart, which is estimated at some 5mins or a maximum of 12 trucks per hour.

For this reason, contingency planning for night-time spoil removal is being considered. There are a number of sensitive receivers in the form of residential and temporary (e.g. Hotel/ Serviced Apartments) accommodation in the vicinity of the Barangaroo-Wynyard and BPL worksites.

## 5.14 Network modelling

The assessment of construction traffic impacts and likely future mitigation responses is being undertaken with the assistance of the RTA's Paramics SCATSIM models of the CBD and Rozelle-Pyrmont corridor (PUR model). The full modelled area extends from Victoria Road at Iron Cove bridge in the west, to college Street / Macquarie Street in the east, Hickson Road and the Sydney Harbour Bridge Toll Plazas in the north, to Railway Square and Foveaux Street in the south. Preliminary model results suggest that the impacts associated with cumulative construction at each of the proposed worksites can be mitigated through the measures documented in the TMP. Further analysis with the assistance of the Paramics models will be undertaken to define impacts and preferred mitigation measures.

### 5.14.1 Cumulative impacts

Cumulative construction traffic impacts may occur where multiple construction projects utilise the same construction traffic routes at the same time. Cumulative impacts could include traffic congestion, particularly if truck movements occur during peak hour and if truck queuing occurs.

At a local level, the following traffic routes may experience cumulative impacts as a result of multiple construction activities within their vicinity:

- Broadway and Pitt Street are likely to be common local construction traffic routes for the CBD Metro Central Station, the Carlton United Breweries development, the UTS development and the CityGrid project (Belmore Park substation).
- Pitt, Bathurst and Park streets are likely to be common local construction traffic routes for the CBD Metro Town Hall Square Station and services building, the Sydney Water Board site redevelopment and the Boyd development.
- Castlereagh Street is likely to be a common local construction traffic route for the CBD Metro Martin Place Station and the CityGrid project (City East substation likely to be in the vicinity of Philip, Bent, Bligh and O'Connell streets).
- Margaret, Sussex, Hickson, Napoleon, Erskine and King streets are likely to be common local construction traffic routes for the CBD Metro Barangaroo-Wynyard Station, the CityOne development and the Barangaroo development.
- Union and Pyrmont streets are likely to be common local construction traffic routes for the CBD Metro Pyrmont Station, the Star City development and the Global Switch site development (Pyrmont Street only).
- Victoria Road and The Crescent/City West Link are likely to be common local construction traffic routes for the White Bay construction site and CBD Metro Rozelle Station, the Balmain Tigers development, the Inner West Bus Project, the Terry Street development, the Baileys Marine project and the White Bay Cruise Passenger Terminal.

At a regional level, CBD Metro construction traffic routes in and out of the CBD include the Western Distributor, Cleveland Street and the Eastern Distributor. Given the proximity of other projects to the CBD Metro construction sites, many of these construction traffic routes are likely to be used simultaneously by other construction traffic vehicles.

The impact of partial street closures has been assessed. There is the potential for further impacts to city traffic if other road closures associated with other projects occur concurrently (e.g. partial or full temporary closure of Little Albion, Dalley and Underwood streets for the CityGrid project). Multiple road closures have the potential to cause confusion to drivers and result in congestion to traffic if sufficient detours or other alternative arrangements are not provided and planned effectively. Sufficient detail of the location and timing of any other road closures is not available for further assessment at this point in time.

## 5.15 Summary of network adjustments required

The following points summarise the main network adjustments and impacts of the construction activity:

- Adjustments to on street parking, loading and taxi zones;
- Adjustment to access of rear loading dock for Moreton's Hotel;
- Potential closure of Margaret Street either northern or southern footpath between Kent and Clarence Streets;
- Closure of Napoleon Street southern footpath;
- Closure of southern carriageway of Napoleon Street and conversion of one eastbound lane to a lane westbound;
- Staged cut and cover construction across Kent Street, with adjustments to TCS at Napoleon and Margaret Streets resulting in one lane per direction operation in Kent Street with potential turn bans;
- Staged cut and cover construction across Sussex Street with adjustments to TCS at Shelly Street, resulting in one lane per direction with removal of turn lanes;
- Temporary closure of Shelly Street between Lime Street and Sussex Street to general traffic;
- Temporary closure of Margaret Street between Clarence and Kent Streets to all traffic;
- Pedestrian control gates to facilitate trucks crossing footpaths resulting in minor delays to pedestrians whilst trucks are accessing worksites;
- Temporary potential removal of peak hour right turn ban and modifications to Sydney Harbour Bridge tidal flow arrangements at Clarence Street;
- Potential reconfiguration of westbound approach lane configuration of Margaret St on approach to Clarence Street;
- Closure of Kent Street pedestrian tunnel between Westpac building & Wynyard Station;
- Closure of York Lane pedestrian arcades;
- Staged construction activity requiring road occupancy in York Lane and changes to traffic access arrangements in York Lane;
- Diversion of pedestrians travelling north-south on the eastern kerb of Clarence Street between York Lane and Erskine Streets;
- Reductions in passenger waiting area at bus stops on west side of Clarence Street south of Margaret Street; and
- Use of traffic control to facilitate truck egress from York Lane worksite.

## 6.0 TMP Compliance and Approvals

The TMP has been prepared having regard to the requirements of the Director General and Department of Planning for information to support the Environmental Assessment for the project.

The TMP considers the management of traffic at worksites as well as the effects on pedestrians and traffic movements resulting from construction or changed conditions at worksites. Further, the TMP considers in depth the legislated requirements for the provision of a safe and effective local road network management throughout all stages of construction.

### 6.1 Compliance with Director General Requirements

Details of the specific construction related tasks from the Directors General's requirements to support the environmental assessment are further outlined in **Table 6.1**.

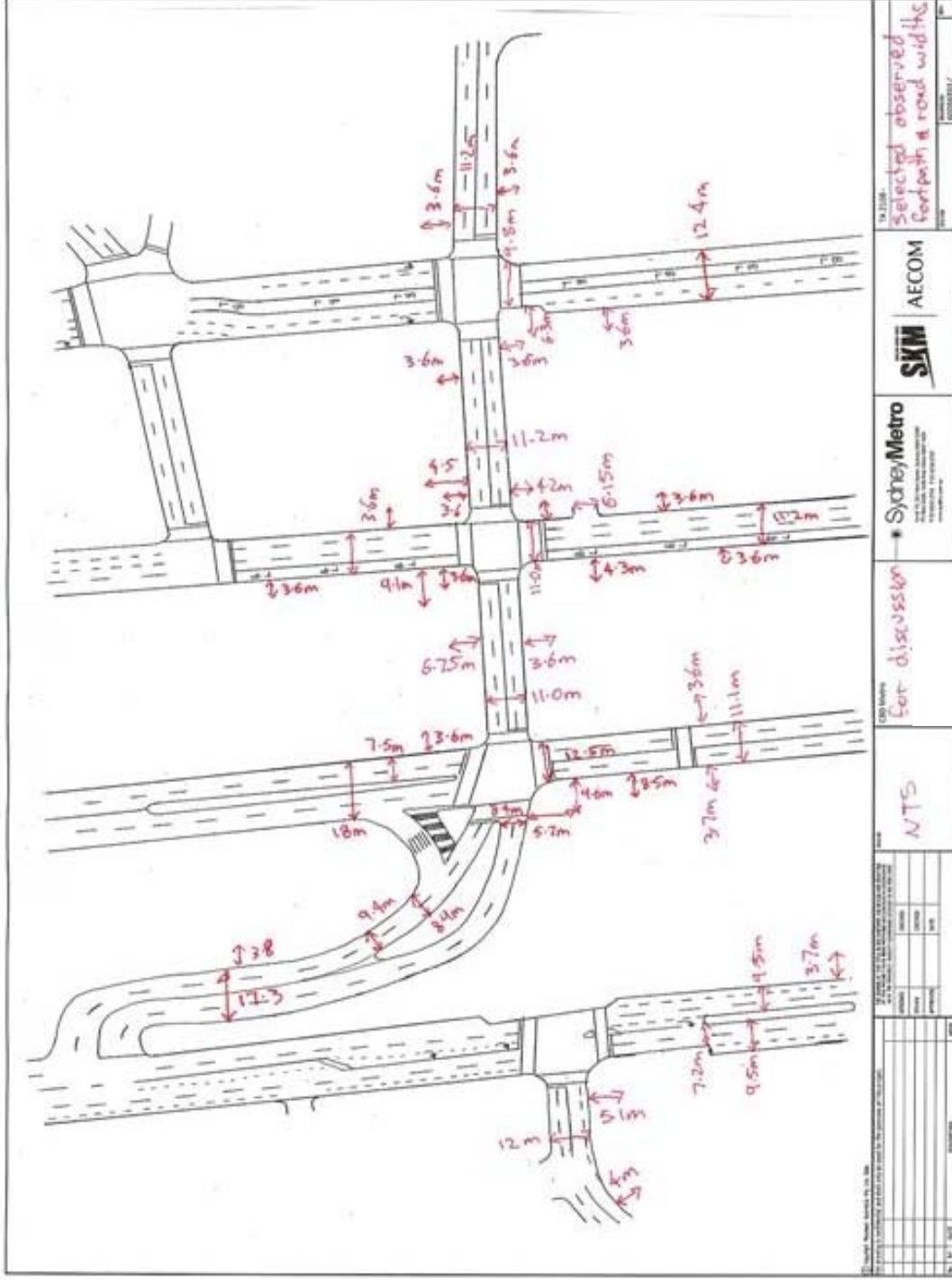
**Table 6.1: Director General's Environmental Assessment Requirements**

Requirement	Condition Requirements	Reference
<b>Key issues</b>	<p><b>General Construction Impacts –</b> Consider the potential impacts associated with the construction of the project, and present a management framework for construction works to ensure that impacts are mitigated, monitored and managed. The EA must include consideration of, and a management framework for:</p> <ul style="list-style-type: none"> <li>• construction noise and vibration, including a considered approach to scheduling construction activities including transport, blasting and tonal or impulse noise generating works).</li> <li>• construction traffic including a considered approach to route identification and scheduling of transport movements, having regard to               <ul style="list-style-type: none"> <li>- Alternatives to road transport;</li> <li>- The number, frequency and size of construction related vehicles (both passenger, commercial and heavy vehicles);</li> <li>- The nature of existing traffic on construction access routes (with consideration of peak traffic times and sensitive road users, including emergency vehicles and buses)</li> <li>- The need to close, divert or otherwise reconfigure elements of the road network associated with construction of the project; and</li> <li>- How construction traffic impacts will be managed to minimise the potential for cumulative traffic impacts with other major construction activities in the region (whether this is to be managed as part of the subject project, or through a separate overarching mechanism beyond the direct scope of the project)</li> </ul> </li> </ul>	<p>Individual Station Traffic Management Plans.</p> <p>Noise Assessment (by others)</p> <p>Individual Station TMP's and Environmental Assessment</p> <p>Site Specific TMPs and Environmental Assessment</p> <p>Construction Plan (by others)</p>

Requirement	Condition Requirements	Reference
	<p>The EA must also present a strategy for monitoring and mitigating traffic impacts, with a particular focus placed on those activities identified as having the greatest potential for adverse traffic flow, capacity or safety implications, and a broader, more generic approach developed for day-to-day traffic management.</p> <ul style="list-style-type: none"> <li>• Spoil management</li> <li>• Water Impacts</li> </ul>	<p>Station specific TMP's This Framework Traffic Management Plan.</p>
<b>Consultation</b>	<p>The EA must reflect an appropriate and justified level of consultation with relevant parties during the preparation of the EA, including:</p> <ul style="list-style-type: none"> <li>• local, State or Commonwealth government authorities and service providers such as the Roads and Traffic Authority, RailCorp, State Transit Authority, the Ministry of Transport, the Department of Environment and Climate Change, the Department of Water and Energy, NSW Maritime, Sydney Ports, Barangaroo Delivery Authority, Sydney Harbour Foreshore Authority, Leichhardt Council, and City of Sydney Council;</li> <li>• the public, including specialist interest groups and affected landowners.</li> <li>• The EA must describe the consultation process, document all community consultation undertaken to date and identify the issues raised (including where these have been addressed in the EA).</li> </ul>	<p>This Framework Traffic Management Plan. Site specific TMPs. The EA Report</p>

## Appendix A Footpath and Lane Widths in the Vicinity of Barangaroo-Wynyard Metro Station

## Appendix A Footpath and Lane widths in the vicinity of Barangaroo-Wynyard Metro Station



## Appendix B Existing Parking Restrictions in Vicinity of Barangaroo-Wynyard Metro Station





## Appendix B3 Kerbside Changes

Table 4: Barangaroo-Wynyard Station and Barangaroo Pedestrian Link Tunnel

Station	Location	Existing Kerb Use	Proposed Changes to Kerbside Parking restrictions	Loss of Loading / Parking and duration		Mitigation Strategy
				Enabling	Construction	
Barangaroo-Wynyard and Barangaroo Pedestrian Link Tunnel	Sussex Street, eastern side south of Shelly Street	Taxi Stand	Relocation of Taxi Stand to facilitate construction staging of cut and cover	-	3 spaces Duration approximately 2 years of PRI	Remove timed parking southbound in Sussex Street, north of Shelly Street
	Sussex Street, western side northbound, north of Shelly Street	Sydney Explorer bus stop	Relocate Sydney Explorer Bus stop to facilitate construction staging of cut and cover	-	3 spaces permanently from start of PRI	Remove timed parking northbound in Sussex Street, north of Shelly Street
Barangaroo-Wynyard Transport House	Clarence Street, northbound north of Erskine Street	Timed loading, off peak parking	Remove on street loading to create truck call forward location	3 spaces May be required for enabling activities	3 spaces Duration of spoil activity. May also be required for IMO activities	Nil proposed
	York Street southbound, western side south of Margaret Street	No Parking Authorised (CityRail) vehicles excepted, Mail Zone, part time Bus Stand, part time Taxi Zone	Remove No Parking/other kerb uses to provide a driveway egress point and works zone	6 spaces Authorised (CityRail) spaces (4) removed and up to 2 other spaces, for duration of enabling, PRI and IMO	6 spaces Authorised (CityRail) spaces (4) removed and up to 2 other spaces, for duration of enabling, PRI and IMO	Identify other lower priority kerb uses nearby for conversion + condense existing uses
	York Lane	No Parking CityRail excepted, Loading, off peak parking	Remove loading/No Parking CityRail excepted to provide works site and for traffic management	4 spaces 2 (CityRail) spaces and 2 loading spaces removed, for duration of enabling, PRI and IMO	4 spaces 2 (CityRail) spaces and 2 loading spaces removed, for duration of enabling, PRI and IMO	Nil proposed

Station	Location	Existing Kerb Use	Proposed Changes to Kerbside Parking restrictions	Loss of Loading / Parking and duration		Mitigation Strategy	
				Enabling	Construction		
<b>Barangaroo-Wynyard</b> Clarence Street Option August 09	Margaret Street between Kent and York	Off peak loading	Removal of off peak loading to provide worksite area/traffic capacity	Up to 10 spaces removed, depending on operational need, for enabling	Up to 10 spaces removed, depending on operational need, for PRI and IMO	Nil proposed	
	York Lane	No Parking CityRail excepted, Loading, off peak parking	Remove loading/No Parking CityRail excepted to provide works site and for traffic management	4 spaces 2 (CityRail) spaces and 2 loading spaces removed, for duration of enabling, PRI and IMO	4 spaces 2 (CityRail) spaces and 2 loading spaces removed, for duration of enabling, PRI and IMO	Nil proposed	
	Clarence Street northbound, eastern side between Margaret and Erskine Streets	Timed loading, off peak parking	Remove on street loading to create pedestrian corridor and driveway access point	6 spaces Estimated loss. May be required for enabling.	6 spaces Estimated loss.	6 spaces Estimated loss. Duration of PRI activity. Same or reduced loss will also be required for IMO activities.	Nil proposed
	Clarence Street, northbound north of Erskine Street	Timed loading, off peak parking	Remove on street loading to create truck call forward location	3 spaces May be required for enabling activities	3 spaces	3 spaces Duration of spoil activity. May also be required for IMO activities	Nil proposed
	Clarence Street northbound, western side between Margaret and Erskine Streets	Bus Zone	Relocate bus zone to allow for construction activity of pop up	-	1 bus stop Potentially required for duration of pop-up construction (estimated 6-9 months)	1 bus stop Potentially required for duration of pop-up construction (estimated 6-9 months)	Relocate stop further south in Clarence Street towards Erskine Street that will result in suspension of off peak timed parking.
<b>Barangaroo Pedestrian Link Tunnel</b>	Napoleon Street, westbound west of Kent Street	Timed parking	Remove timed on street parking to provide a worksite	15 spaces Duration of BPL construction activity	15 spaces Duration of BPL construction activity (enabling, PRI and	Nil proposed	

Station	Location	Existing Kerb Use	Proposed Changes to Kerbside Parking restrictions	Loss of Loading / Parking and duration		Mitigation Strategy
				Enabling (enabling, PRI and IMO)	Construction IMO)	
Napoleon Street	Napoleon Street, eastbound west of Kent Street	Timed parking	Remove timed on street parking to provide for traffic management due to two way working in eastbound lanes	2 spaces Duration of BPL construction activity (enabling, PRI and IMO)	2 spaces Duration of BPL construction activity (enabling, PRI and IMO)	Nil proposed
Barangaroo-Wynyard	Kent Street, approximately 100m north and south of Margaret/Napoleon Street intersection	Timed parking, loading	Remove existing loading/timed parking to facilitate construction staging/traffic capacity	12 spaces Maximum loss of parking Extent of loss will change over time. Required for enabling and up to 9 months of PRI activity.	12 spaces Maximum loss of parking Extent of loss will change over time.	Nil proposed
	Kent Street southbound, between Margaret Street and Erskine Street	Timed loading and parking	Removal of loading and off peak parking to provide traffic capacity	5-11 spaces Duration Margaret Street full closure	5-11 spaces Duration Margaret Street full closure	Need for loading/parking loss to be quantified through network modelling
	Erskine Street, both directions between Sussex and York Streets	Timed loading and off peak parking	Removal of loading and off peak parking to provide traffic capacity	5-10 spaces Duration Margaret Street full closure	5-10 spaces Duration Margaret Street full closure	Need for loading/parking loss to be quantified through network modelling
	York Street southbound, western side north of Erskine Street	Bus stand, loading, other uses	Relocation of bus stand area to provide traffic capacity for left turn	5 spaces Extent to be determined by modelling. Estimated at up to 5 vehicle spaces	5 spaces Extent to be determined by modelling. Estimated at up to 5 vehicle spaces	Alternative bus stand spaces in York Street or elsewhere to be used or new space created in York or Jamison Street

Figure 4.1: Proposed worksites and changes to kerbside parking allocation

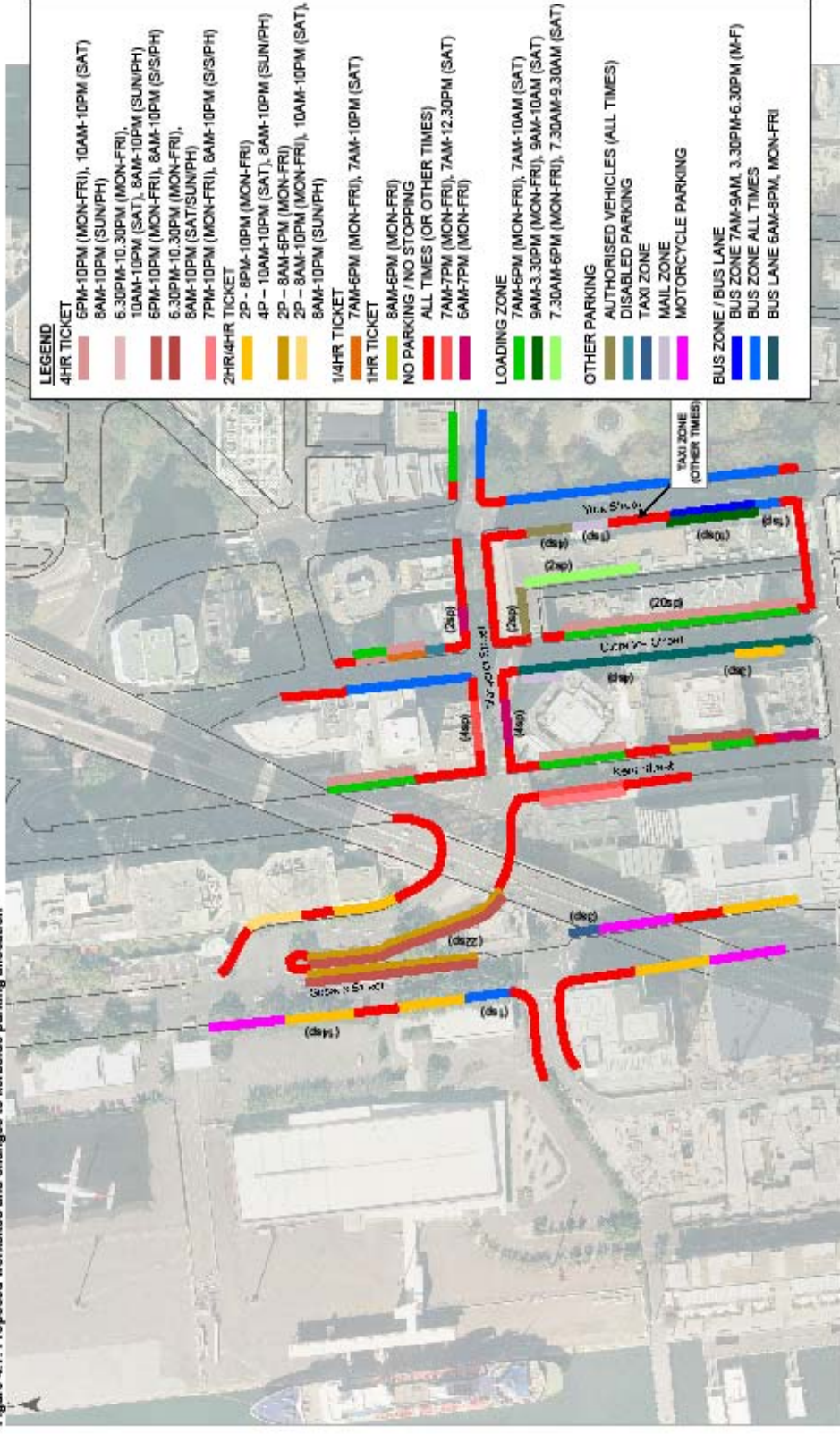


Figure 4.2: Proposed worklines and changes to kerbside parking allocation

