Appendix J Pyrmont Station Traffic Management Plan

SydneyMetro

CBD Metro
TA 2108 Transport and Access Advisor

Pyrmont Station - Traffic Management Plan

Sydney Metro

24 August 2009

Document Reference: **CBD-2108-MSM-EP-DO-080**

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Pyrmont 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 Government Ministry of Transport.
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 Pyrmont worksites for CBD Metro.

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 traffic management scenario to meet project requirements.

Traffic impacts have been determined based on worksite layouts, construction methodologies and proposed hours of operation provided by the CBD Metro TA2100 adviser and are current as to the date of this report. PARAMICS modelling has been undertaken by the RTA to determine the traffic impact of the proposed construction traffic, utilising the CBD and Victoria Road network models. The results of this modelling are reported separately.

Two alternate construction options were developed for Pyrmont. Pyrmont Station -Alternative 1; and a modification to Alternative 1 to achieve an improved streetscape for Union Square titled Pyrmont Station -Alternative 2. In traffic management terms, the alternative schemes have similar impacts, however, Alternative 2 has more localised impact on Pyrmont Street.

There are no major network adjustments resulting from this Plan. However for Alternative 1, there are primarily pedestrian, cycleway, local residential access, property access and parking impacts, which are:

- A reduction in the foot path width on the northern side of Miller Street to an effective width of about 1.9m, due to erection of hoarding and support posts for site sheds over the footpath;
- Closure of the eastern footpath and part of the roadway on Mount Street to accommodate expansion of the Western worksite.
- Removal of kerbside parking for some six cars on the western side of Mount Street to maintain a minimum width of 4.5m wide traffic lane for access to the worksite;
- Closure of the eastbound traffic lane on Union Street between Paternoster Row and Pyrmont Street to accommodate expansion of the Eastern worksite;
- Closure of part of the western footway on Pyrmont Street, south of Union Street (effective width of about 2.1m to accommodate expansion of the Eastern worksite;
- Diversion of traffic exiting Paternoster Row westbound to Union Street to Harris Street. Currently traffic from Paternoster Row exits via Union Street eastbound to Pyrmont Street;
- The existing two way cycle path on Union Square will require diversion due to the proposed closure of the cycleway on Union Square and diversion via Pyrmont Street, (North) John Street, and Union Street. Alternate construction methodologies are being investigated to reduce the duration or avoid the need for this diversion: and
- Removal of existing kerbside parking for some five meter spaces on the northern side on Union Street and reduction in the width of the northern footpath. The removal of trees, street furniture and outdoor seating is addressed separately in the environmental assessment.

Primary impacts of construction under Pyrmont Station- Alternative 2 are similar to Alternative 1, with further impacts on Pyrmont Street, due to the proposed expanded eastern worksite.

Under Alternative 2 the proposed eastern worksite requires closure of the western kerbside lane of Pyrmont Street for pedestrian diversion and truck access, altered configuration of through traffic lanes on Pyrmont Street generating additional impacts in relation to:

- Modified alignment of traffic lanes on Pyrmont Street, south of Union Street to provide a two lane two way section adjacent to the eastern kerbside, site hoarding, truck access and pedestrian path within the existing road reserve.The existing traffic signal design for the Pyrmont Street and Union Street will require modification accordingly;
- A reduction in on-street parking on Pyrmont Street, with some 20m (3 spaces)of existing time restricted parking proposed to be removed from the western kerbside and some 50m (some 8 spaces) from the eastern kerbside;
- A reduction in the foot path width on the western side of Pyrmont Street to an effective width of about 1.5m, due to diversion of the pedestrian path and truck access; and
- Truck movements generated on Pyrmont Street, north of Union Street, John Street and Harris Street, in addition to Pyrmont Bridge Road and Miller Street.

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

- Traffic control at site access locations to manage pedestrian, cycleway, local access and construction truck traffic.
- Potential traffic control of resident's vehicles from Paternoster Row, cyclists and construction trucks from the eastern construction site exiting to Harris Street to reduce pedestrian and vehicle conflicts.

The major residual impacts of the construction traffic on the road network highlighted in this Plan are:

- An increase in truck movements on Miller Street and at the signalised intersection with Harris Street;
- A minor increase in truck movements on Pyrmont Street, John Street under Alternative 2.
- A re-routing of a section of the cycleway, due to the closure of the Union Square section under Alternative 2;

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;
- Wynyard-Barangaroo;
- Pyrmont;
- Martin Place; and
- Rozelle

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

The Metro Pyrmont Station is located on the western side of the CBD on Pyrmont Peninsular. Metro Pyrmont Station platforms will be located underneath Union Street, the precinct is shown in **Figure 1.1** following.

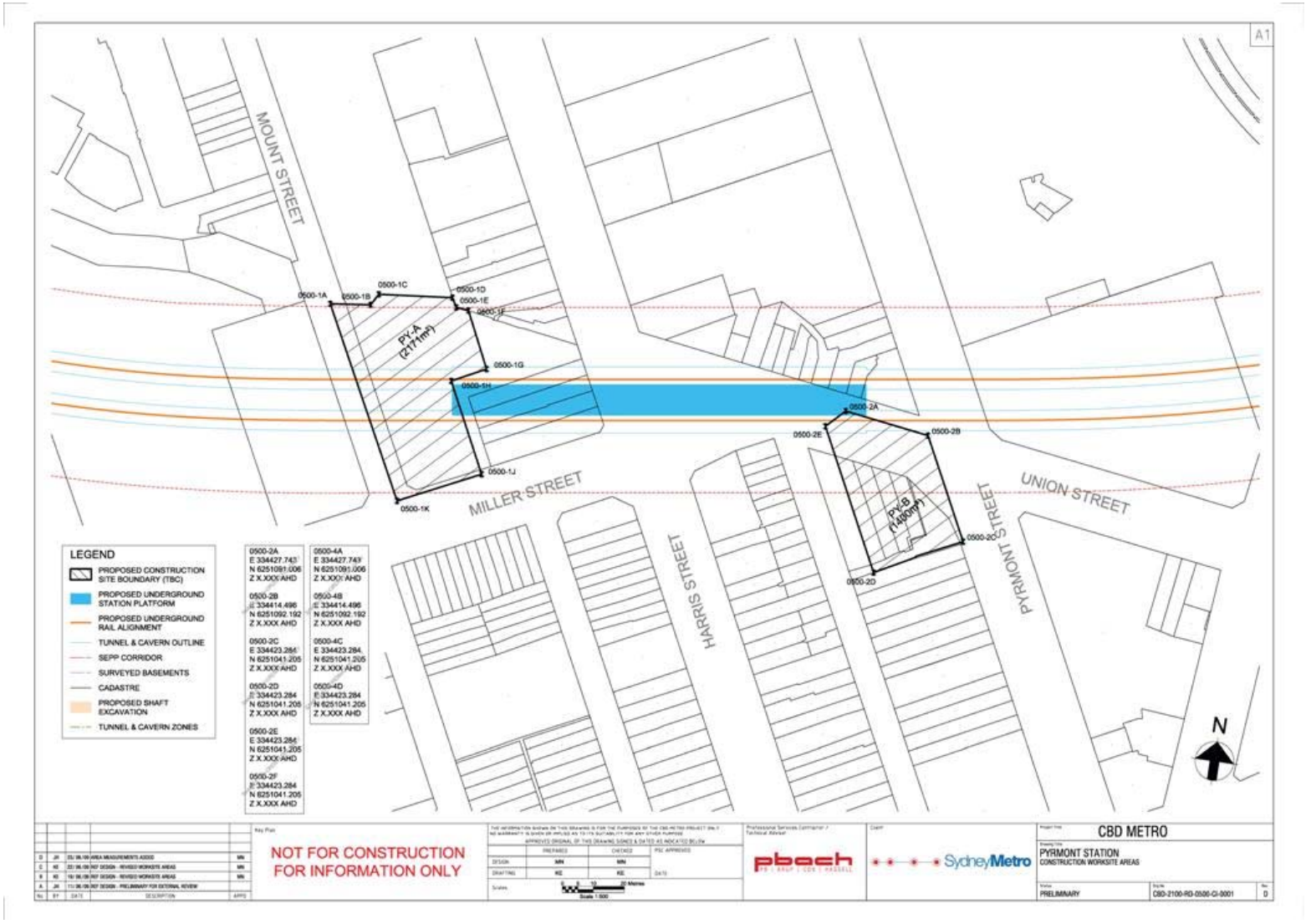
Figure 1.1: Pyrmont Station Precinct

Two alternate construction options have been developed for Pyrmont Station:

- Pyrmont Station - Alternative 1, as shown in **Figure 1.2**; and
- Pyrmont Station - Alternative 2, as shown in **Figure 1.3**.

The alternative schemes are similar. However Alternative 2 was developed to reduce the impacts on Union Square, by retaining the front of existing buildings facing the square. This TMP discusses both options, which vary primarily in respect of truck access routes and impacts on the Pyrmont Street frontage to the eastern worksite.

Figure 1.2: Pyrmont Station-Alternative 1-Worksite locations



Source: CBD Metro, TA2100 July 2009.

Figure 1.3: Pyrmont Station-Alternative 2-Worksite locations


Union St
Harris St
Pattersons Rd

1.2 Scope of this report

This Traffic Management Plan (TMP) for the Metro Pyrmont Station outlines the construction methodology and timeframes, based in advice from the CBD Metro, Construction Technical Advisors (TA2100), concept staging of works impacting on roads and transport road works; and traffic management measures to mitigate the impacts of construction.

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.

1.3 Hierarchy of construction traffic management plans

This TMP operates under the Framework Traffic Management Plan (FTMP), 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, once appointed.

The traffic management plan hierarchy is as follows:

1) Framework TMP (Sydney Metro)
2) Site Specific TMPs (Sydney Metro)
3) Construction TMPs (PRI & IMO Contractors)
4) Construction TCPs (PRI & IMO Contractors)

1.4 Report structure

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

Section 1 Describes the CDB Metro project and TMP process
Section 2 Describes the Existing Transport context for Pyrmont Station
Section 3 Outlines the Proposed Work Method
Section 4 Details the Worksite Operation and Management
Section 5 Assesses the Traffic Impact and Mitigation Measures

2.0 Existing Situation

2.1 Pedestrian movements and volumes

The Pyrmont precinct is within walking distance of the Sydney CBD, approximately 13 minutes walk from Centrepoint to Union Square. Pyrmont Bridge, which runs between Market Street in the east (city side) and Pyrmont Bridge Road in the west (Pyrmont side), provides the major pedestrian / cycle link.

The key pedestrian desire lines in Pyrmont include a major east-west desire line across the peninsula. This runs along Union Street and Miller Street which links Darling Harbour and the CBD in the east, the central commercial area of Pyrmont and the Anzac Bridge and Fish Markets to the west.

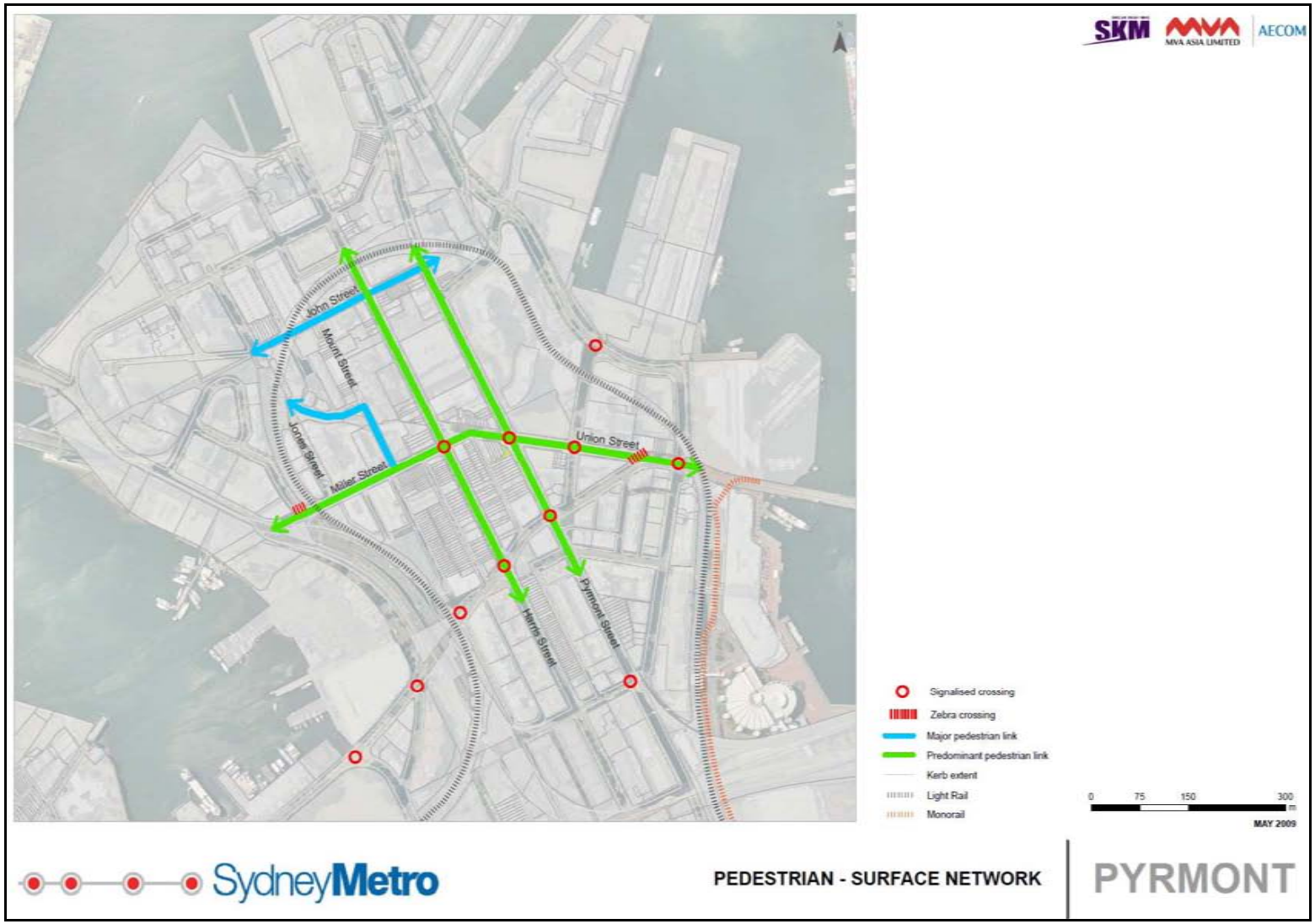
The pedestrian network is illustrated in **Figure 2.1** following.

The following observations and data collections were undertaken during the site visits:

- Pedestrian flows are generally higher on the northern side of Union Street than on the southern side. Cycle flows are heavy on the south side of Union Street;
- The major north-south pedestrian route through Pyrmont is along Harris Street;
- The key pedestrian desire line in Pyrmont is the major east-west desire line along Union Street and Miller Street, linking Darling Harbour and the CBD in the east, the central commercial area of Pyrmont and the Anzac Bridge and Fish Markets to the west;
- A pedestrian walkway integrated to the building edge on the eastern side of Edward Street links Union Street and Pirrama Road. However, the grade change, poor signage, constrained width and tram route crossing make this an unattractive link;
- The major north-south connections are Harris Street and to a lesser extent Pyrmont Street;
- Gradients along Union Street and Miller Street may act as a constraint to pedestrian movement, particularly for less mobile people; and
- Gradients west of Union Square are a barrier to pedestrian movement (particularly cliff top and cliff bottom walks).

At the north end of the section of Mount Street, a set of steep stairs leads to the continuation of Mount Street, at a much higher level. There is also a pedestrian path that links up with Jones Street and a crossing of the light rail line. Miller Street runs south of the proposed entrance, linking Darling Harbour and the CBD in the east (via Union Street), the central commercial area of Pyrmont and the Fish Markets to the west and is considered to be part of the major desire line across the peninsula. The site is also located in relative proximity to the current Fish Market light rail stop, to the south west of the proposed station.

Figure 2.1: Pedestrian Surface Network



The nearest signalised pedestrian crossing of Miller Street is located at the Miller Street / Harris Street intersection approximately 70m east of the western worksite . However, it has been noted that the majority of pedestrian movement occurs in an east-west direction along the north side of Miller Street. Refer to **Photograph 2.1** and **Photograph 2.2.**

Photograph 2.1: Union Street looking west at Paternoster Row to Union Square/ Harris Street

Source: AECOM, 26 March 2009

Photograph 2.2: Harris Street looking west to Miller Street

Source: AECOM, 26 March 2009

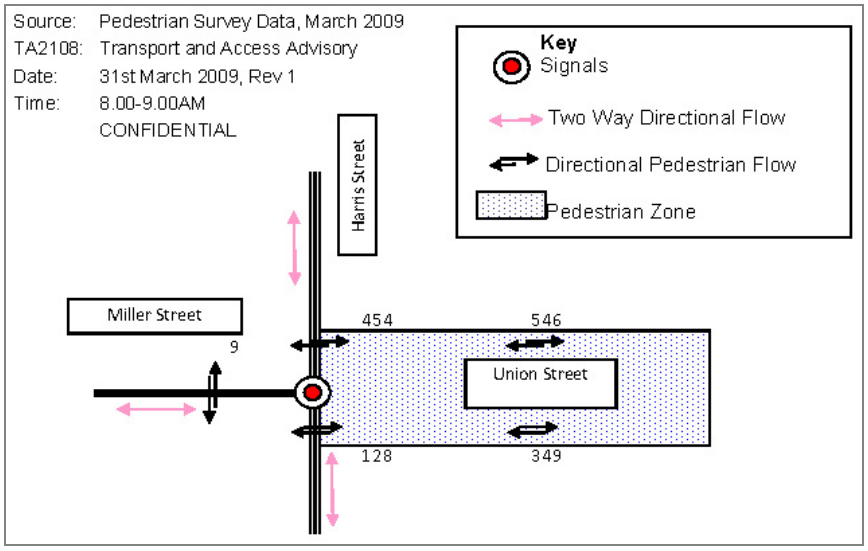
2.1.1 AM and PM peak hour surface network

Observations of passenger boarding and alighting bus services were undertaken by AECOM in March / April 2009 during the AM and PM peak periods. The following observations were made:

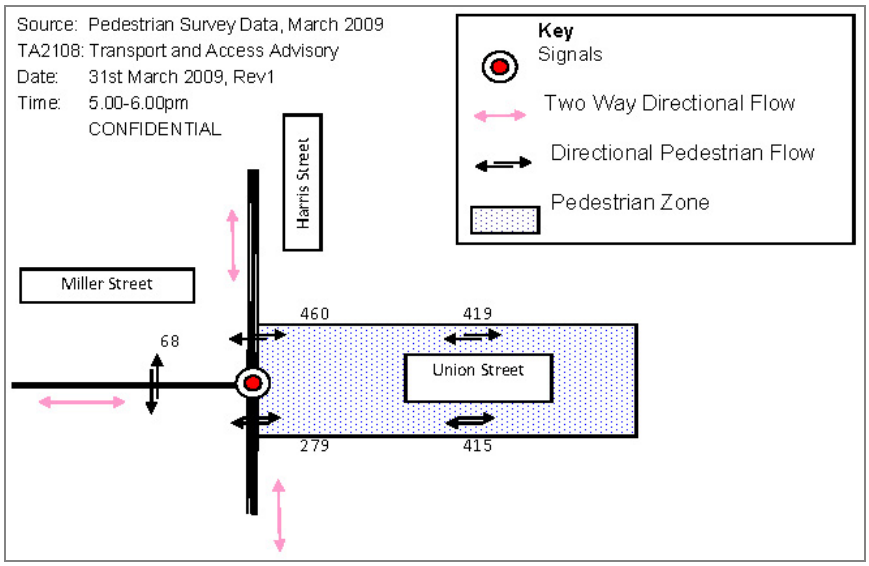
- In the AM and PM peak hour, there are significant numbers of pedestrians crossing Miller Street from/to the northern part of Union Square; and
- The southern side of Union Square is dominated by cycle movements, particularly during peak periods.

Figure 2.2: AM, Midday and PM Peak Hour Pedestrian Volumes on Union Square and at Miller Street

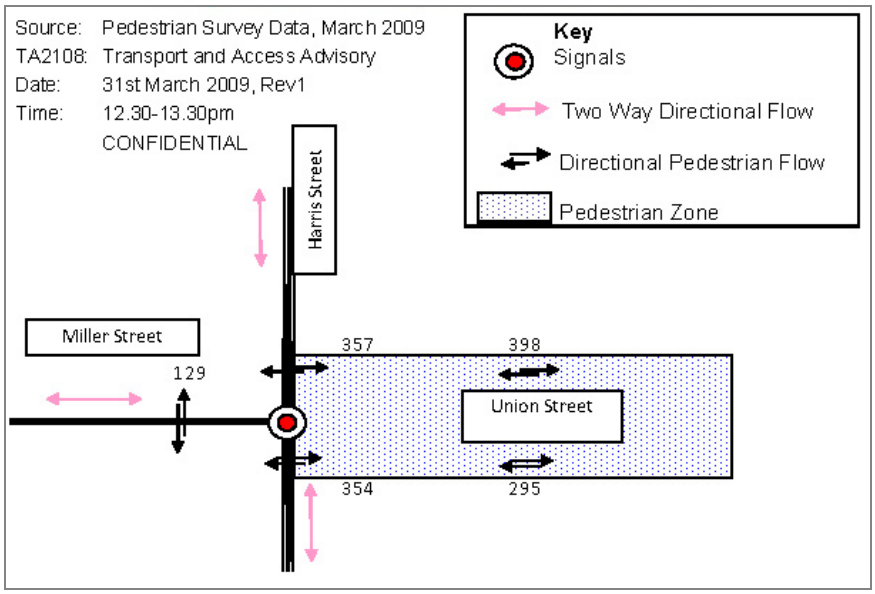
AM Peak Hour



PM Peak Hour

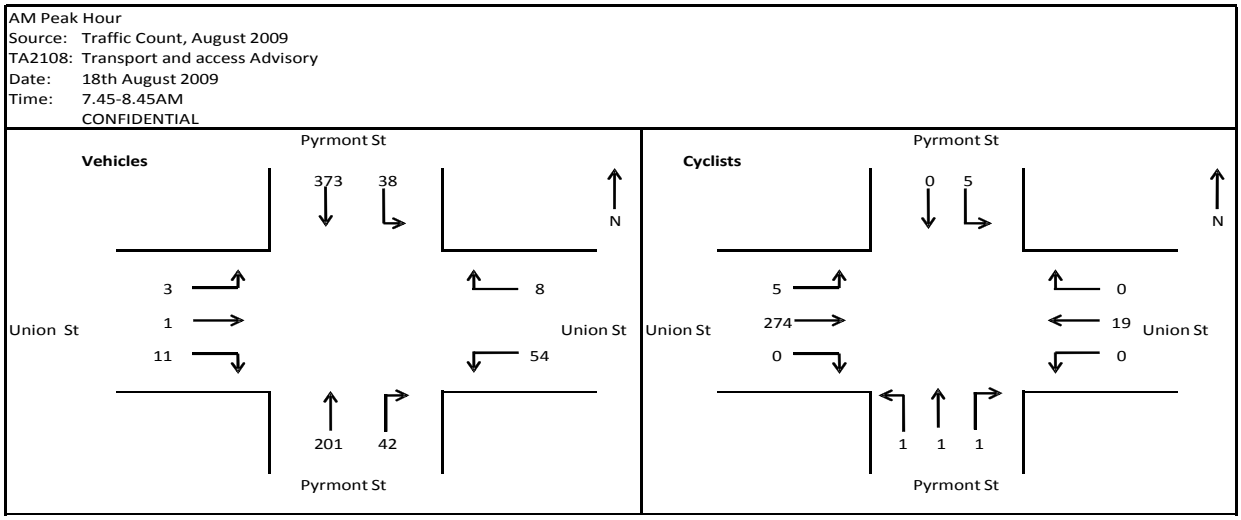


Midday Peak Hour

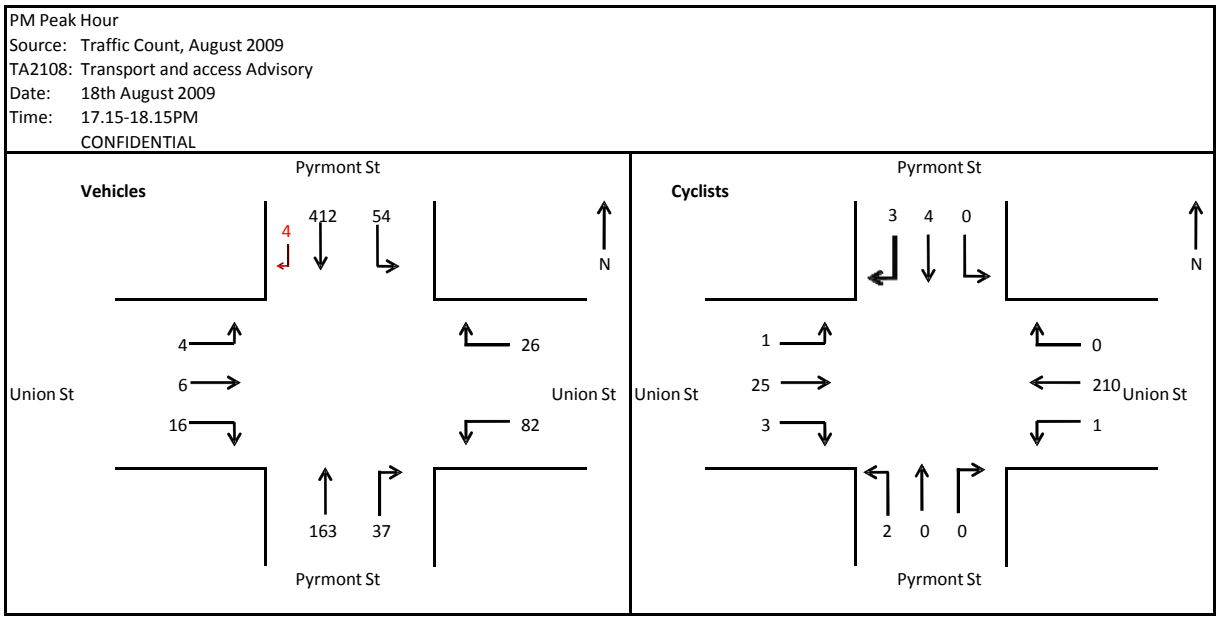


Further peak hour surveys of the Union Street and Pyrmont Street intersection, which included cycle movements, were conducted on 18 August 2009 and the results are shown below.

AM Peak Hour – Union Street and Pyrmont Street, August 2009



PM Peak Hour Union Street and Pyrmont Street



2.1.2 Bus routes and stops

Pyrmont is an origin and destination for bus passengers, with services operating between Sydney CBD, Railway Square, Pyrmont and the inner north-west (Victoria Road). Five bus stops are located in the precinct on Harris Street and Miller Street; these provide access to Railway Square, Town Hall, Circular Quay and the inner north-west (via Victoria Road).

The bus stops in proximity to the Pyrmont Station are located along both sides of Miller Street and along Harris Street, providing the following services:

- The bus stops on the western and eastern sides of Harris Street north of Miller Street provide services to and from Star City and Circular Quay respectively; and
- The bus stops on the northern and southern side of Miller Street provide services to and from West Ryde via Victoria Road and Town Hall via Railway Square respectively.

The location of existing bus stops and routes are shown in **Figure 2.3** and **Figure 2.4** and following.

Figure 2.3: Existing bus routes and stop locations- AM peak

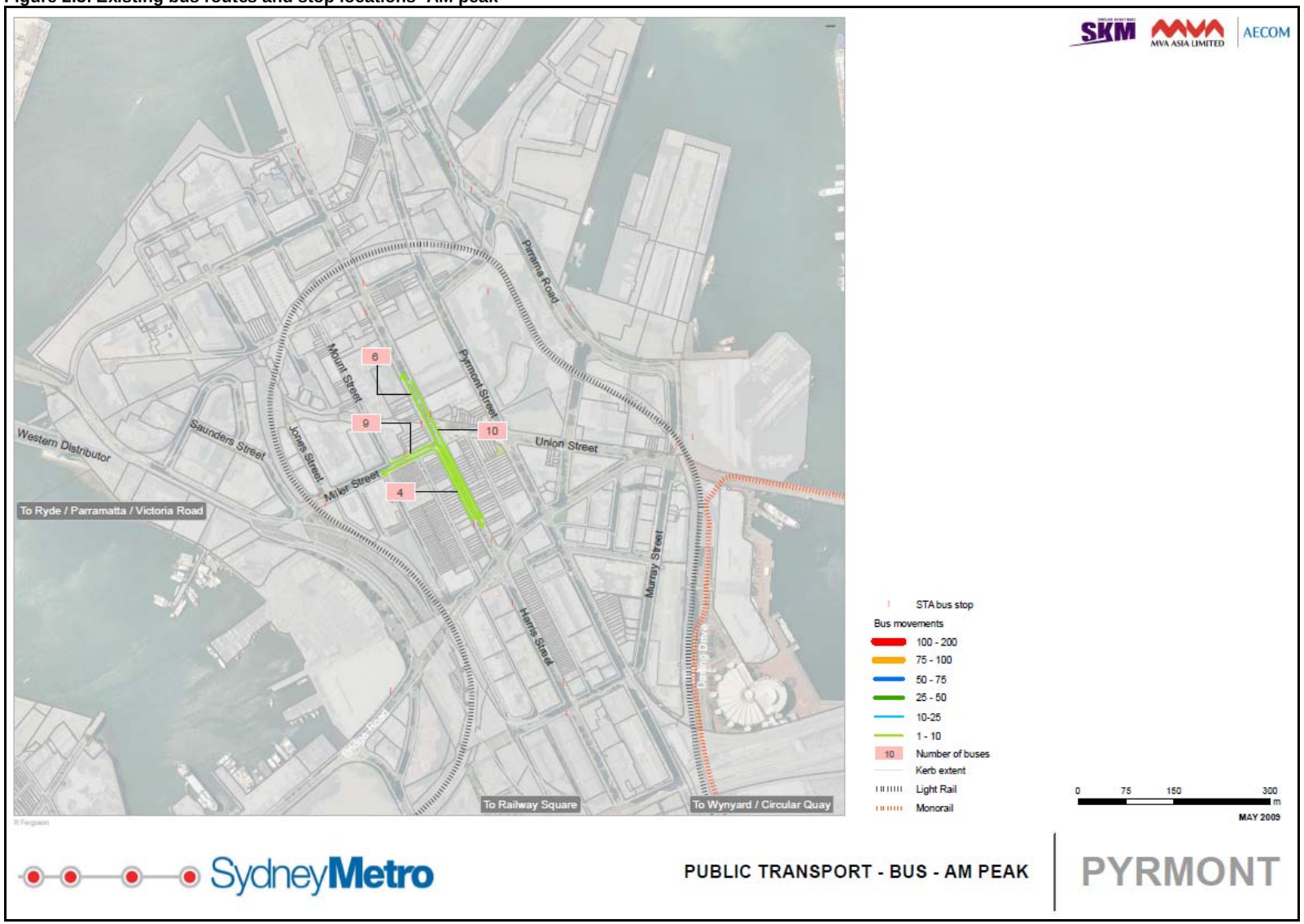
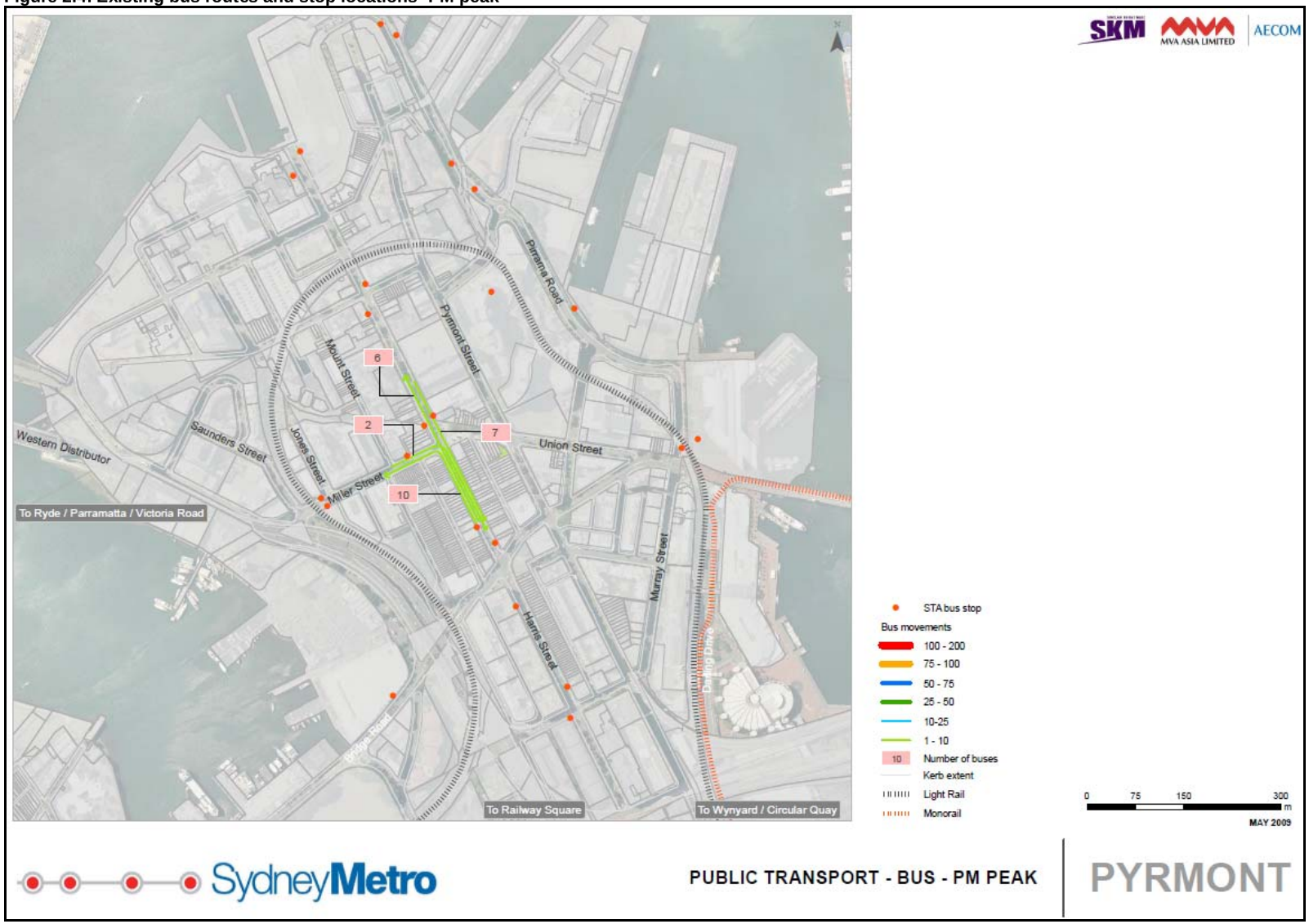


Figure 2.4: Existing bus routes and stop locations- PM peak



2.1.3 Taxis

Taxi ranks in Pyrmont are located on the periphery of Star City. Two ranks are provided at:

- Pirrama Road south side, South of Pirrama Road, Darling Island Road roundabout- 7 spaces (full-time); and
- Jones Bay Road South, adjacent to Star City Casino 7 spaces (Loading zone 7am-5pm (Mon-Sat), other times taxi zone) and at the Pyrmont Street entrance to Star City Casino.

2.1.4 Cyclists

2.1.4.1 Existing cycle network

The major east-west cycle route between the City and Anzac Bridge uses Union Street and Miller Street. The number of cyclists currently using this route is significant with some 940 cyclists using the Anzac Bridge cycleway on weekdays, and 430 cyclists on weekends (2007 data from Cycling in Sydney - Bicycle ownership and use, April 2008, RTA / Ministry of Transport publication). A lesser number travel through Union Square in peak hours, with some 350 cyclists recorded.

Key observations

- Pedestrian / cycle conflicts occur in Union Square particularly during peak periods;
- The east-west cycle route is disjointed with a combination of on-road cycle lanes, signposted cycle route and shared path;
- There is a gap in the City of Sydney bicycle route network on Union Street between Darling Harbour and Pyrmont Street; and
- No formal bicycle parking is available in the precinct.

The exiting cycle network is shown in **Figure 2.5** following

2.1.4.2 Future cycle network

Regional cycle routes (generally separated on-road) are proposed for Union, Miller and Harris Streets by City of Sydney. A local route is proposed for Pyrmont Street south of Union Street. These cycle routes will be implemented in the next 4 years (to 2013) by City of Sydney and their locations are likely to be:

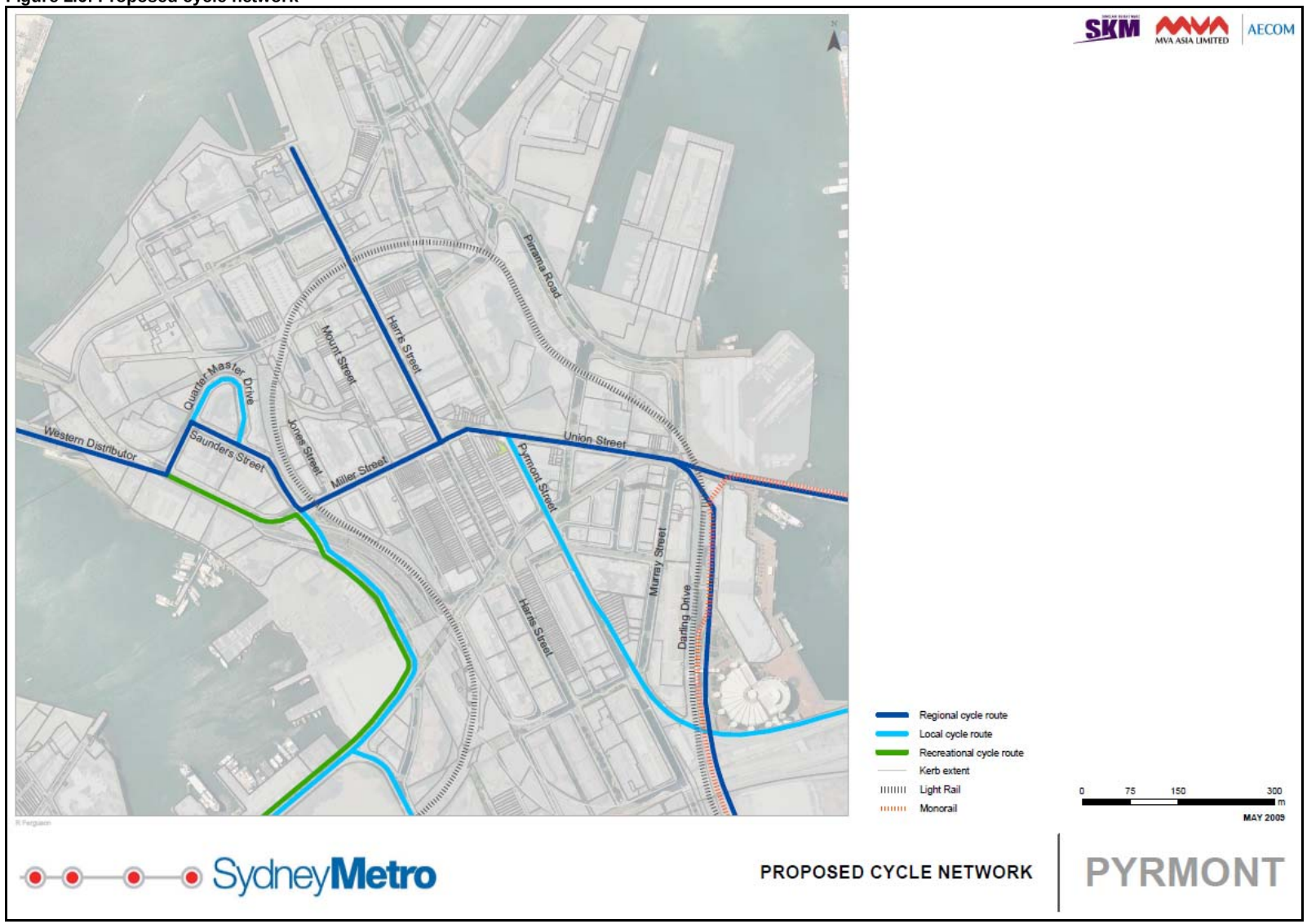
- Union Street – northern side (due for implementation late 2009);
- Miller Street – northern side;
- Harris Street – not known; and
- Pyrmont Street – not known.

Further, City of Sydney is exploring opportunities to introduce secure bicycle parking at bus stops and light rail stations.

The proposed cycle network is shown in **Figure 2.6** following.

Figure 2.5: Existing cycle network

Figure 2.6: Proposed cycle network



2.1.5 Parking

The section of Harris Street, within the Pyrmont precinct, comprises one traffic lane in each direction with kerb side parking and flaring of the pedestrian footpath at intersections. This low speed environment combined with stopping of buses and parking/ unparking vehicles occasionally creates localised congestion along this road, as shown in **Photograph 2.3** following.

Photograph 2.3: Harris Street looking south at Union Street / Miller Street

Source: AECOM, 26 March 2009

Miller Street provides for one traffic lane in each direction with kerbside parking and bicycle lane, as shown in **Photograph 2.4** following.

Photograph 2.4: Miller Street looking west at Harris Street

Source: AECOM, 26 March 2009

On-street parking for approximately six cars is currently provided on the western side of Mount Street, opposite the proposed worksite, as shown in **Photograph 2.5** following.

Photograph 2.5: Mount Street looking north at Miller Street

Source: AECOM, 26 March 2009

Union Street between Pyrmont Street and Paternoster Row provides for some 5 meter parking spaces on the northern side, as shown in **Photograph 2.6**.

Photograph 2.6: Union Street looking west at Pyrmont Street

Source: AECOM, 26 March 2009

Union Street to the east of Pyrmont Street provides for one traffic lane in each direction and kerbside parking, as shown in **Photograph 2.7** following

Photograph 2.7: Union Street looking west at Edward Street

Source: AECOM, 26 March 2009

Photograph 2.8: Pyrmont Street looking south at Union Street

Source: AECOM, 26 March 2009

Paternoster Row provides one northbound traffic lane and kerbside parking on the western side, as shown in **Photograph 2.9** following

Photograph 2.9: Paternoster Row looking south at Union Street

Source: AECOM, 26 March 2009

2.1.6 Traffic signals

Signalised intersections in the vicinity of the worksites are:

- Harris Street, Union Square and Miller Street;
- Harris Street and Pyrmont Bridge Road;
- Pyrmont Bridge Road and the on-load and off-load ramps to the Western Distributor;
- Miller Street underpass of Western Distributor; and
- Union Street and Pyrmont Street.

2.1.7 Existing road network and traffic volumes

The Western Distributor, located to the west and south of the Pyrmont peninsular, is the only highway standard roadway in the vicinity of Pyrmont; and carries up to 130,000 vehicles per day. The interchange with Pyrmont Bridge Road has west facing ramps accommodating 21,000 vehicles per day and the east facing ramps accommodating 13,400 vehicles per day. Refer to **Figure 2.7**.

Access to Pyrmont is provided through a full grade separated interchange with Pyrmont Bridge Road. The intersection of Pyrmont Bridge Road, Bank Street and the Western Distributor off ramp has two complex intersections essentially operating as one. This intersection is often congested in the evening peak period.

Most approaches leading to the Western Distributor intersection have extensive queues. The left turn in the westbound direction from Pyrmont Bridge Road near the Fish Markets can queue back to and through Wattle Street. The right turn westbound from Pyrmont Bridge Road onto the Western Distributor also has extensive delays causing queuing back to Harris Street.

Pyrmont Bridge Road is the only major arterial corridor providing access to the Western Distributor as well as providing access to Glebe, Sydney Fish Markets and the commercial areas fronting Darling Harbour.

Pyrmont Bridge Road connects Darling Drive to Pyrmont and the southern CBD (Chinatown). Pyrmont Bridge Road also links to major attractions such as Star City and areas fronting Darling Harbour.

The road network surrounding Star City and the Pyrmont peninsular are predominantly made up of local roads. This segment of Harris Street carries up to 6,000 vehicles per day and Pyrmont Street south of Pyrmont Bridge Road carries up to 8,400 vehicles per day providing northbound access to the Western Distributor.

Harris and Pyrmont Street are the sub arterial corridors joining Pyrmont Bridge Road at signalised intersections. Harris Street through the precinct has one lane in both directions with kerb side parking and flaring of the pedestrian footpath. This low speed environment combined with frequent stopping of buses creates localised traffic congestion.

Miller Street has a local road function carrying up to 1500 vehicles per day.

The surveyed AM and PM peak hour flows are illustrated in
Figure 2.8 and **Figure 2.9**.

Figure 2.7: Existing road hierarchy

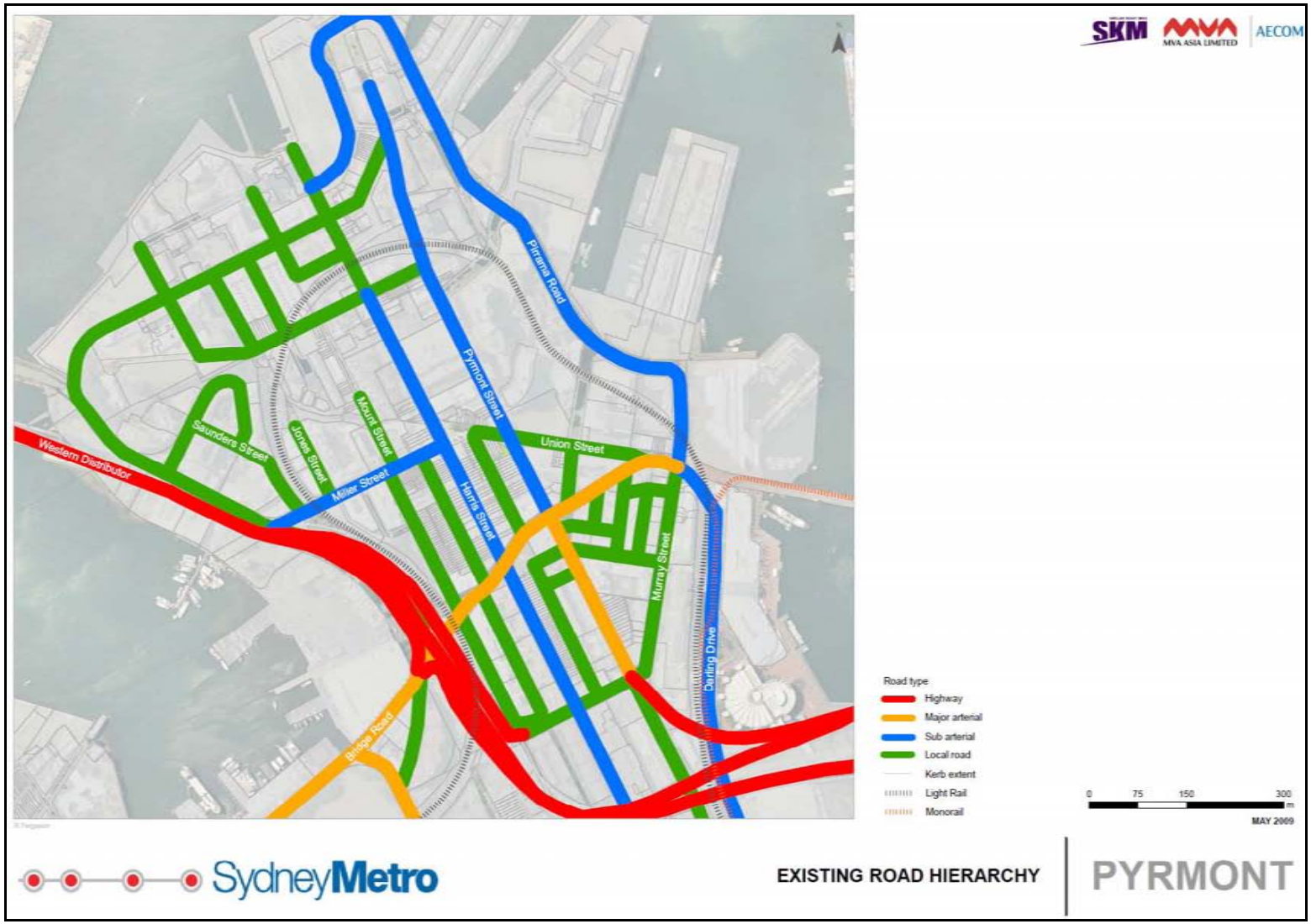
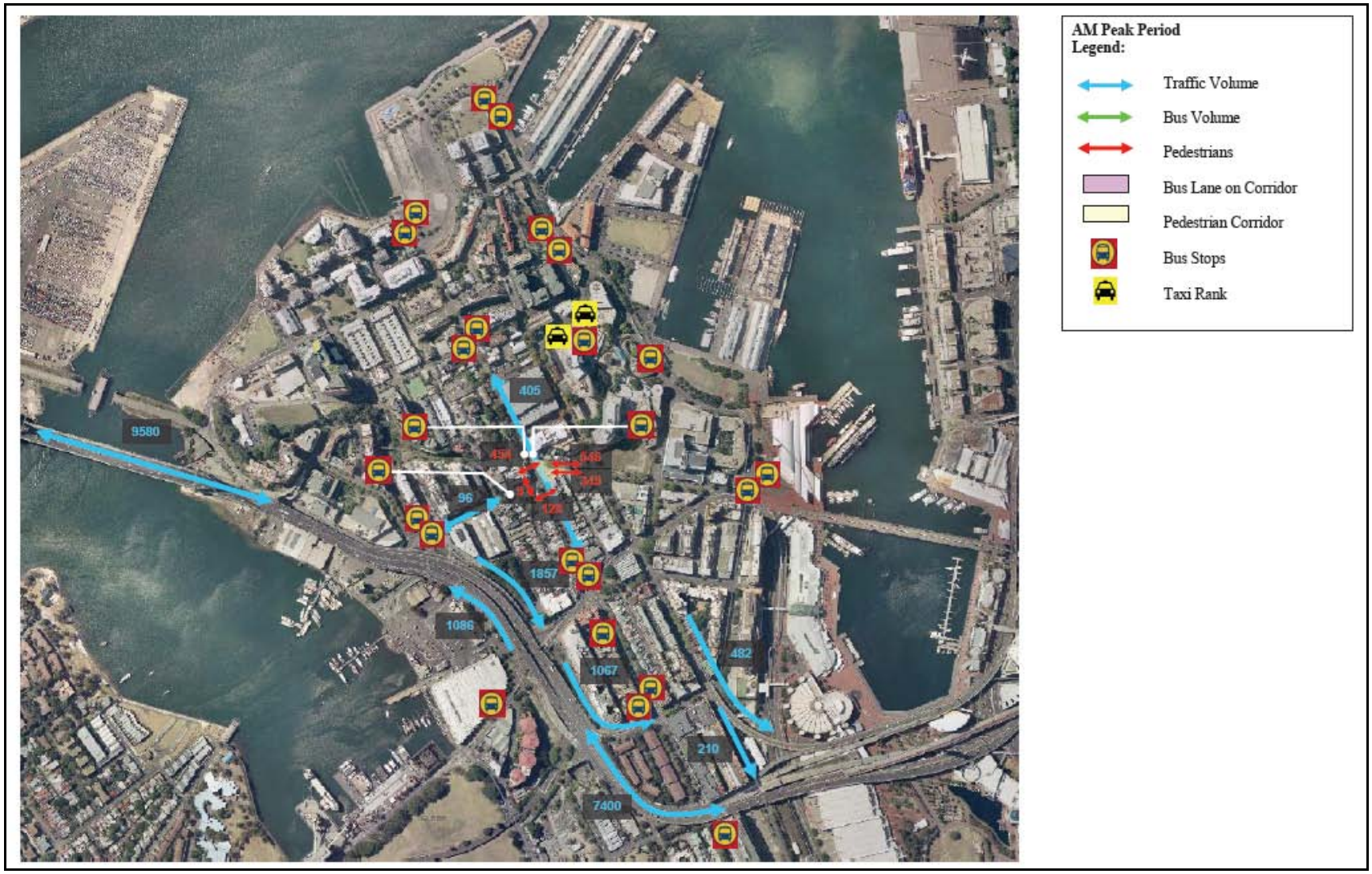
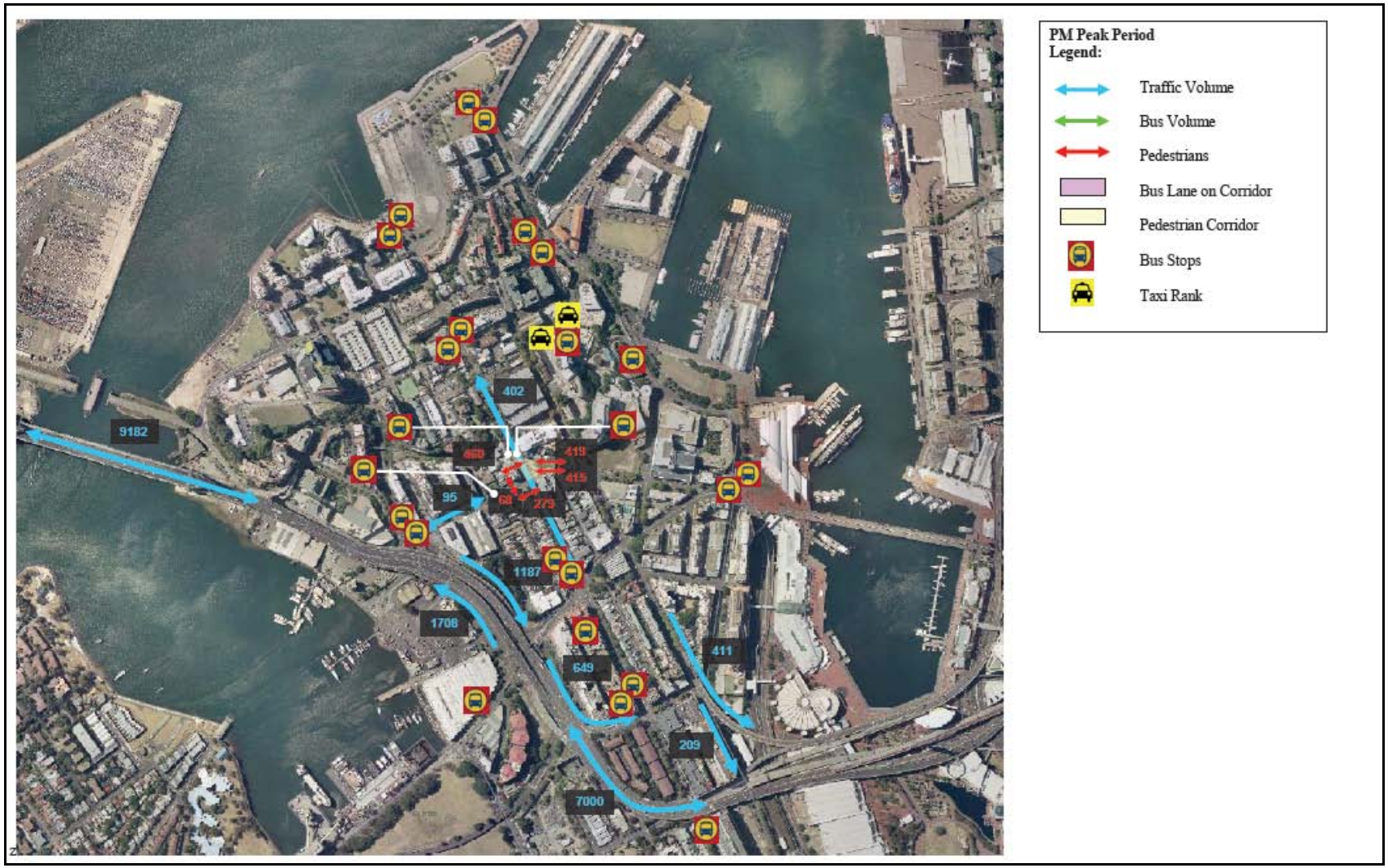


Figure 2.8: AM Peak Hour Traffic and Pedestrian Flows



Source: RTA Traffic Counts & Pedestrian Survey (March 2009)

Figure 2.9: PM Peak Hour Traffic and Pedestrian Flows



Source: RTA Traffic Counts & Pedestrian Survey (March 2009)

2.2 Other proposed developments and streetscape improvements

2.2.1 Star City redevelopment

Sydney Harbour Casino Properties Pty Ltd is proposing alterations and additions to the current Star City Casino on the undeveloped land located north of Union Street between Pyrmont and Union Street. Plans for re-development of Star City are well advanced with proposals to build a new 5 star hotel, restaurants, bars and improved entertainment and gaming facilities. The hotel will include over 300 rooms and 500 parking spaces. Construction is expected to commence in 2009 and be completed by 2011.

Darling Walk is currently being redeveloped and will include:

- Up to eight storeys, or 58,000sqm, of commercial office space;
- 600 public and 200 private underground car spaces;
- Retail and leisure facilities; and
- New public open space.

A key feature of the Darling Walk project will be a new pedestrian gateway linking Darling Harbour and the CBD, and improved pedestrian access across Harbour Street.

2.2.2 Other known development proposals

Redevelopment proposals for Pyrmont, based on approved developments on the City of Sydney, Commercial Development Monitor, December 2008, include:

- 21-43 Harris Street (some 18,400m^2 of office/ retail space); and
- 38-42 Pirrama Road (some 18,600m^2 of office space).

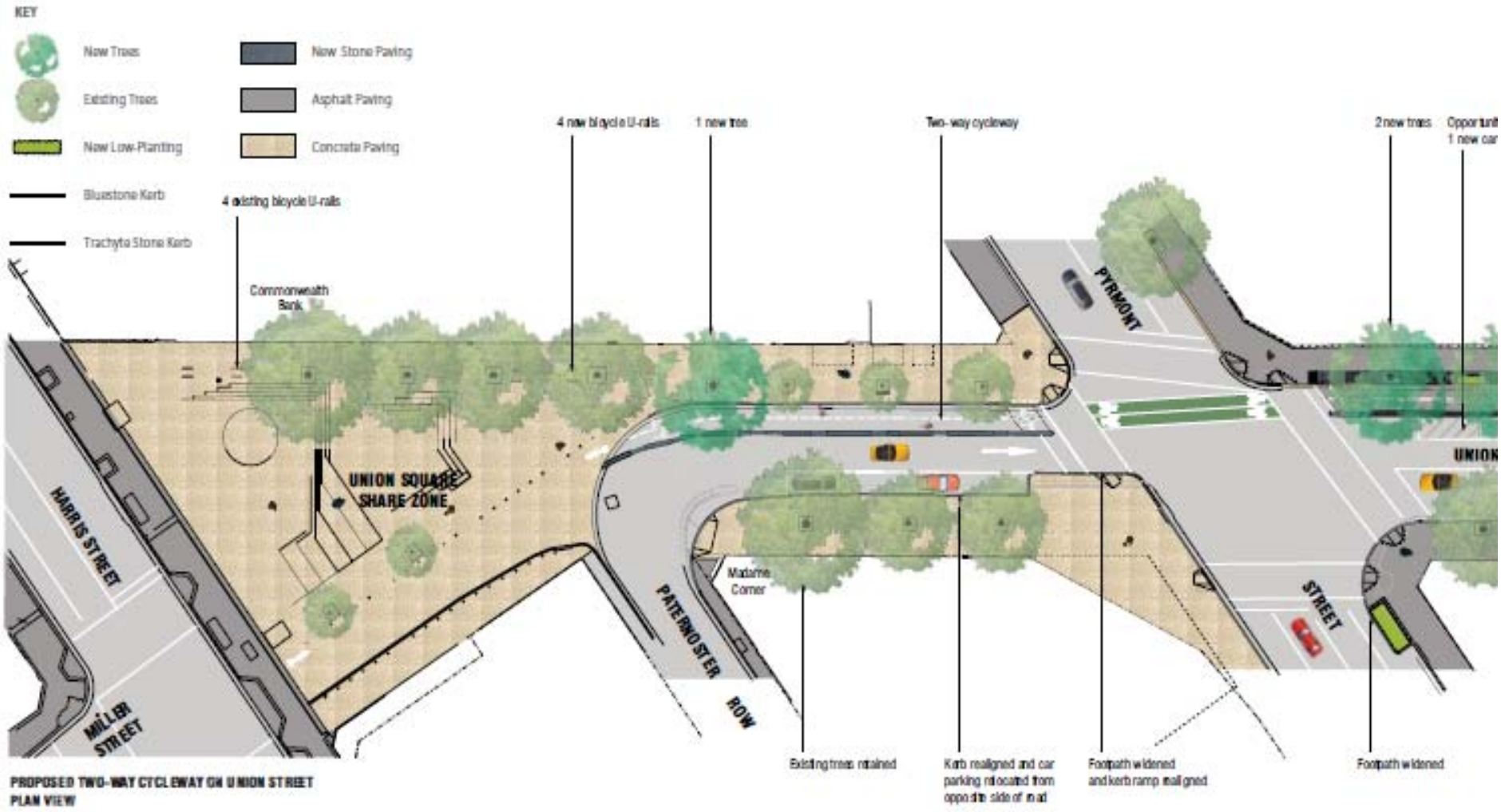
The sites are considered sufficiently remote as to not affect traffic movements at the proposed worksites.

2.2.3 City of Sydney proposed streetscape improvements

The Harris Street upgrade identifies public domain and streetscape improvement projects on Harris Street to support of an integrated long term project to revitalise Harris Street as the “village” main street, connecting Pyrmont from the waterfront to Ultimo and Broadway.

Figure 2.10 show the proposed pedestrian/ cycle improvements for Union Street.

Figure 2.10: Union Street Pyrmont, Cycle and Pedestrian Improvements



Source City of Sydney, City of Villages, Union Street, Pyrmont, Concept, November 2008

3.0 Proposed Work Method and Program

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 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 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 the following table.

3.1 Indicative construction timeframe

An indicative construction program timeframe is shown in **Table 3.1** following.

Table 3.1: Indicative Construction Timeframe

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, 9 July 2009.

4.0 Worksite Operation and Management

4.1 Worksite locations

Worksite locations for Pyrmont Station are proposed, as follows:

- Corner of Mount Street (cul-de-sac) and Miller Street (Western Site); and
- Corner of Union Street and Pyrmont Street (Eastern Site).

4.2 Standard spoil truck size

A 12.5m dual rear and single front axle has been adopted as the maximum sized vehicle to access worksites for spoil removal. Given tight worksite spatial constraints, the manoeuvrability of the vehicle within the worksite is of primary importance. Articulated or truck and dog vehicle combinations are not ideal for use at most sites for spoil operations, given safety concerns with running these large vehicles on the city streets.

However larger trucks including articulated vehicles may be used at other stages of the contract for deliveries to the site and other non spoil removal activities. The actual truck size will be determined by the contractor and specified in the Construction Traffic Management Plans.

4.3 Truck manoeuvring requirements

It is assumed that concertina gates to control pedestrians crossing the site access driveways would operate in parallel with the outside edge of site boundary hoardings. The wider the driveway (and separation of the concertinas), the less the lane width required on the street from which the truck is either entering or departing in order to allow it to turn to or from the kerbside lane.

In order to assess this requirement, an AUTOTRACK turning path simulation was undertaken for a 12.5m truck. The worksite boundaries have been established having regard to this truck size.

4.4 Access for workers

Access for workers will be via the existing pedestrian footpath network or via a shuttle bus to the site. Provision of a shuttle bus service will be a matter for the PRI and IMO contractors to consider. The most likely sites for worker parking and an associated shuttle bus service is White Bay and possibly Barangaroo.

It is assumed that workers who do not use the shuttle bus, or if a shuttle bus is not provided, will arrive at the various sites by public transport. Given the high levels and accessibility of public transport to the CBD and that construction hours not coinciding with peak periods for office workers, the use of public transport is not anticipated to be an issue.

4.5 On-site parking

The limited areas available for on-site parking will generally preclude the provision of on-site parking for the general workforce. However there may be limited parking required for operational purposes at each of the sites for the project engineer / foreman / inspectors etc which may account for one or two vehicle spaces.

Access to worksites for material and equipment required by tradespersons during IMO / fit out stage may be limited either by size constraints or other concurrent activities. Consideration will be given to storing materials and equipment remotely at either White Bay or possibly Barangaroo and transferring items when needed.

4.6 Truck access for Pyrmont Station- Alternative 1

4.6.1 Truck access locations

Access to the worksites for Pyrmont Station- Alternative 1 is proposed as follows:

a) Western Site- Truck access to the western worksite is proposed via Mount Street and Miller Street.
b) Eastern Site- Truck access is proposed via a left turn entry from Pyrmont Street with exit via Union Square to Harris Street at Miller Street.

Truck access would differ under Alternative 2 with trucks not accessing Union Street/Square but remaining in Pyrmont Street.

4.6.2 Approach and departure routes for trucks

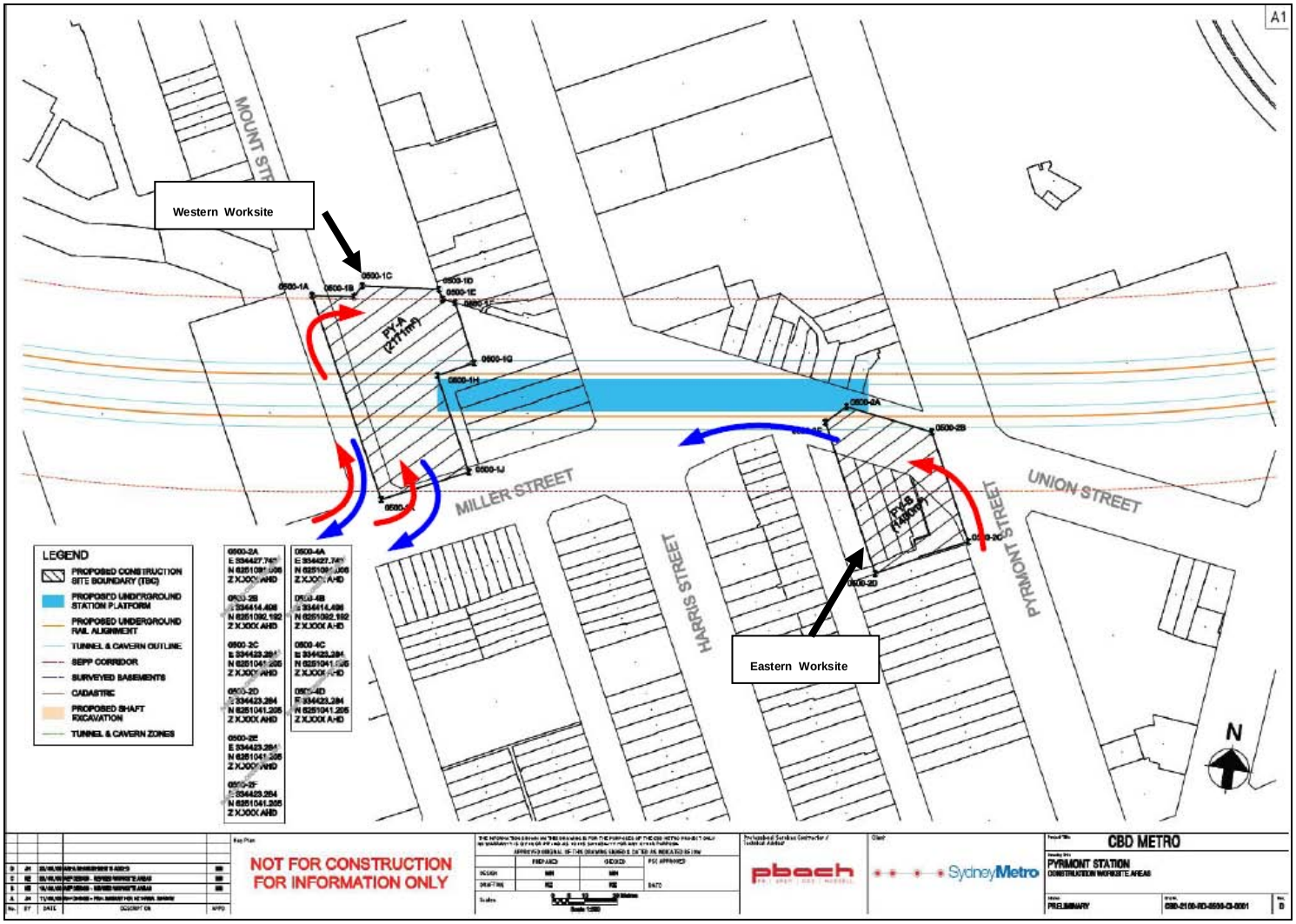
The approach route for both sites under Alternative 1 is proposed via the Anzac Bridge, off-loading to Pyrmont Bridge Road. For the western site on Miller Street, drivers could use the underpass to loop back to Miller Street. An alternate route would be to off-load at Pyrmont Bridge Road and approach via Harris Street to Miller Street. Exiting trucks would use Miller Street to Harris Street, Pyrmont Bridge Road and on-load to the Western Distributor.

A similar approach route for the eastern site is proposed, approaching via Pyrmont Bridge Road to Pyrmont Street and entering the site via a left turn. Drivers would then exit through the existing cycleway to Harris Street and then back to the Western Distributor via Pyrmont Bridge Road.

The access roadways are adequate for the medium size (approximately 10.5m length) truck envisaged to use the Pyrmont worksites.

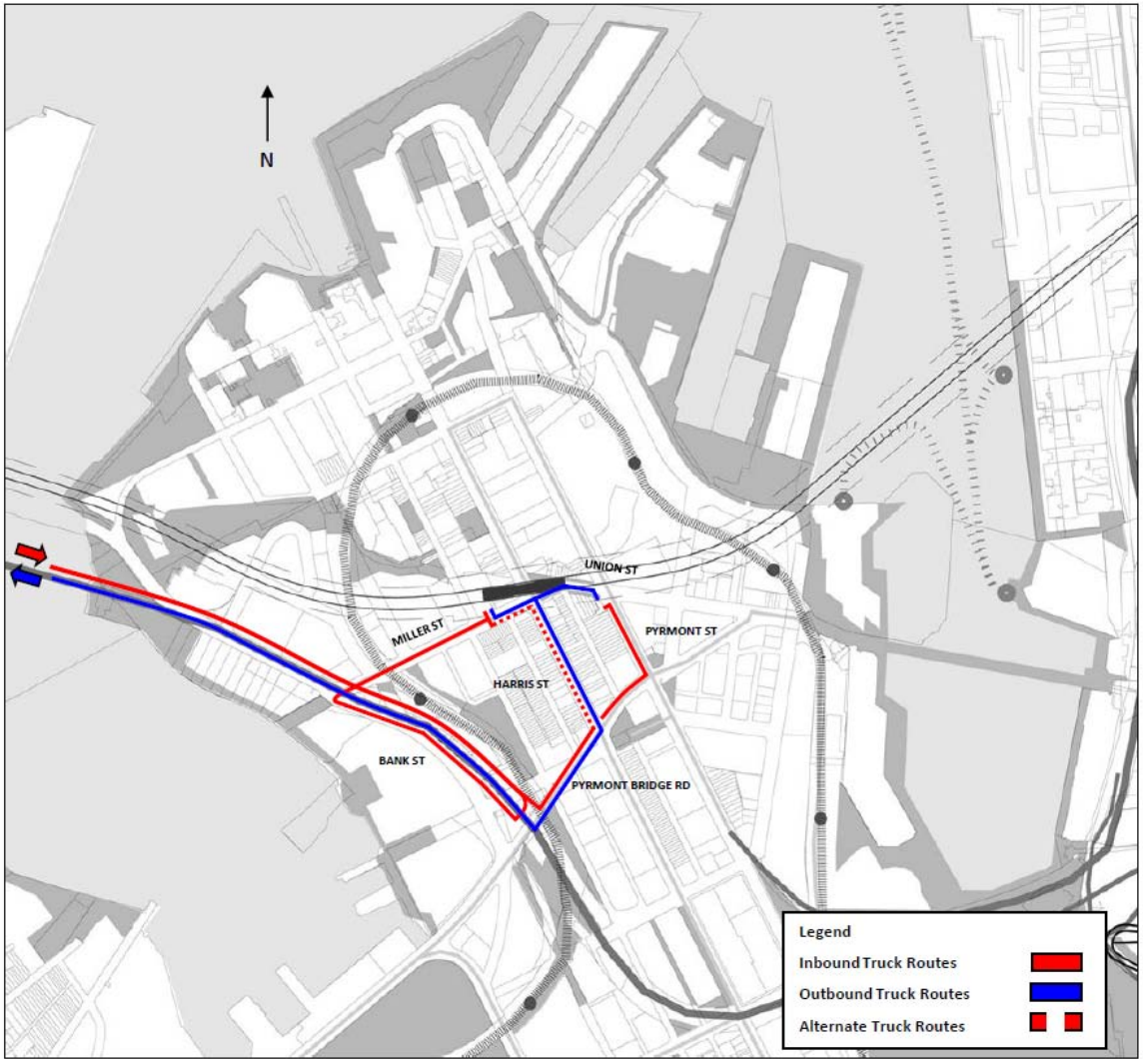
Figure 4.1 following shows the site access locations for Pyrmont Station-Alternative 1. While **Figure 4.2** following shows the truck approach and departure routes for Pyrmont Station-Alternative 1.

Figure 4.1: Site Entry and Exit Locations- Pyrmont Station- Alternative 1



Source: Pyrmont Construction Worksite Plan, CBD Metro, TA2100 July 2009.

Figure 4.2: - Truck Access Routes -Pyrmont Station —Alternative 1



Source: CBD Metro TA2100 and TA2108, July 2009

4.7 Site management for Pyrmont Station- Alternative 1

4.7.1 Site access and security

The Pyrmont worksite(s) will be hoarded off and enclosed to provide public safety and site security, together with minimising noise impacts for neighbouring residents and businesses. Truck access locations will be gated with the gates remaining closed, when not required for truck entry/exit movements. This will mitigate impacts on pedestrian movement on frontage roads, in addition to the visual, dust and noise impacts of the work site(s).

4.7.2 Pedestrian access

4.7.2.1 Western worksite

Due to the constrained site areas, the hoardings will extend from the property boundary (existing building line) to the kerb line at the Miller Street, to permit site offices to be erected above the footpath. The pedestrian walkway will be maintained below the hoardings, with footway capacity affected the hoarding supports, which will reduce the effective walkway width to about 2.6m at the Miller Street frontage.

Photograph 4.1: Miller Street looking east at worksite frontage

Source: AECOM August 2009

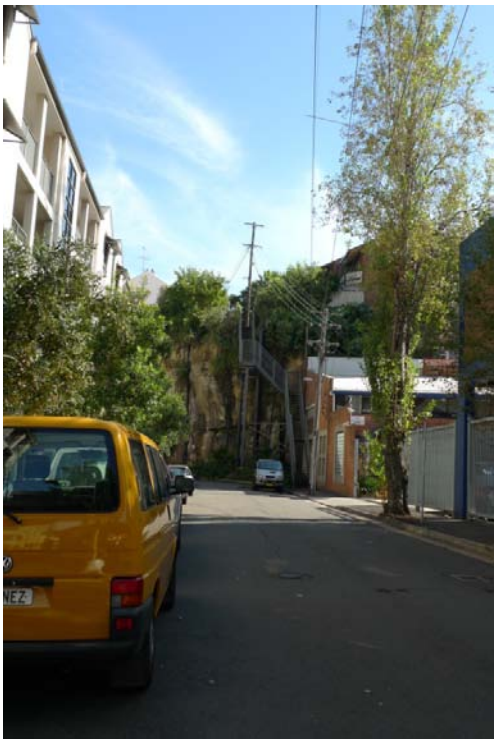
For the Western Worksite, it is further proposed to extend the site area across the Mount Street eastern footpath, requiring closure of the footpath for the duration of the works. Mount Street is a dead-end street serving local resident access and for access to existing commercial premises on the eastern side of the street, which will form the proposed worksite. A set of pedestrian stairs is located at the end of the street for pedestrian access to the upper Pyrmont peninsular. Observations indicate that the existing pedestrian movements on the street are low and the western footpath will maintain adequate pedestrian access.

The existing conditions on Mount Street are shown in **Photograph 4.2** and **Photograph 4.** following.

Photograph 4.2: Mount Street northern end looking towards Miller Street

Source: AECOM, 26 March 2009

Photograph 4.3: Mount Street looking north at Miller Street



Source: AECOM, 26 March 2009

4.7.2.2 Eastern worksite

Due to the constrained site area the hoarding will extend from the property boundary (existing building line) to the kerb line at the Pyrmont Street frontage, to permit site offices to be erected above the footpath. The pedestrian walkway will be maintained below the hoarding, with footway capacity affected the hoarding supports, which will reduce the effective walkway width by about 500mm or to about 2.4m at the Pyrmont Street frontage.

Photograph 4.4: Pyrmont Street looking south at Union Street

Source: AECOM August 2009

4.7.3 Management of truck access at footpath crossings

The worksite locations will require trucks to cross existing footpaths on Mount Street / Miller Street / Pyrmont Street. From observation the footpaths are not as heavily used as CBD locations. However, within Union Square, peak times for pedestrian movement occur in the morning, lunchtime and afternoon peak periods, when some 900, 690 and 830 pedestrians per hour (two way) use the square, respectively.

All trucks will enter and exit the worksites in a forward direction to minimise potential pedestrian conflicts with drivers able to observe pedestrians.

4.7.3.1 Western worksite

Management of the driveway to Miller Street is proposed to reduce potential conflicts between pedestrians and trucks. This would take the form of swing or concertina gates and traffic controllers to stop pedestrian movement on the footpath and deter pedestrians from using the roadway. Potential conflicts are more likely in the morning, afternoon, midday peak periods and at weekends due to the Fish Market activity. At other times pedestrian movements on the northern footway are low.

The Mount Street access will be able to operate without supervision given the footpath closure, absence of active frontages and low usage of the street. Traffic controllers will be available to monitor site access, in particular to avoid pedestrians walking onto the Mount Street roadway, with potential conflicts with turning trucks.

At other times, outside peak periods, truck drivers may be able to enter and exit observing normal requirements to give way to pedestrians when crossing footpaths. This would be supported by give way signage and line marking for exiting drivers to reinforce this requirement.

4.7.3.2 Eastern worksite

Paternoster Row is currently one way northbound toward Union Square with exit available via Union Street to Pyrmont Street. Traffic that previously turned right out of Paternoster Row to exit to Pyrmont Street will now turn left to access Harris Street via Union Square for the duration of construction. This left turn movements from Paternoster Row may potentially conflict with two way cycle movements. And require monitoring in peak hours in conjunction with truck egress movements.

Management of the Pyrmont Street access and particularly the exit through Union Square will need to be managed in peak periods and monitored for the remainder of operating hours. In addition, the exit of trucks to Harris Street will require drivers to give way to pedestrians on the footpath and to both Miller Street and Harris Street traffic, given that the exit movement will be uncontrolled at the existing signalised junction. At peak times, this exit route may need to managed to improve safety. Consideration may also be given to incorporating the truck egress and pedestrian crossing movements into the Harris Street and Miller Street traffic signals.

4.8 Management of pedestrian and cycle movements for Pyrmont Station-Alternative 1

For the eastern worksite, a minimum width of 5.0m is proposed between the building line of Pyrmont Street and the site hoarding, in order to maintain pedestrian and cycle access through Union Street.

This width is too narrow to accommodate existing pedestrian movements and a separated cycleway, therefore it will be necessary to delineate the space to allow safe shared use or control cycle movements (e.g. cyclists would dismount and walk).

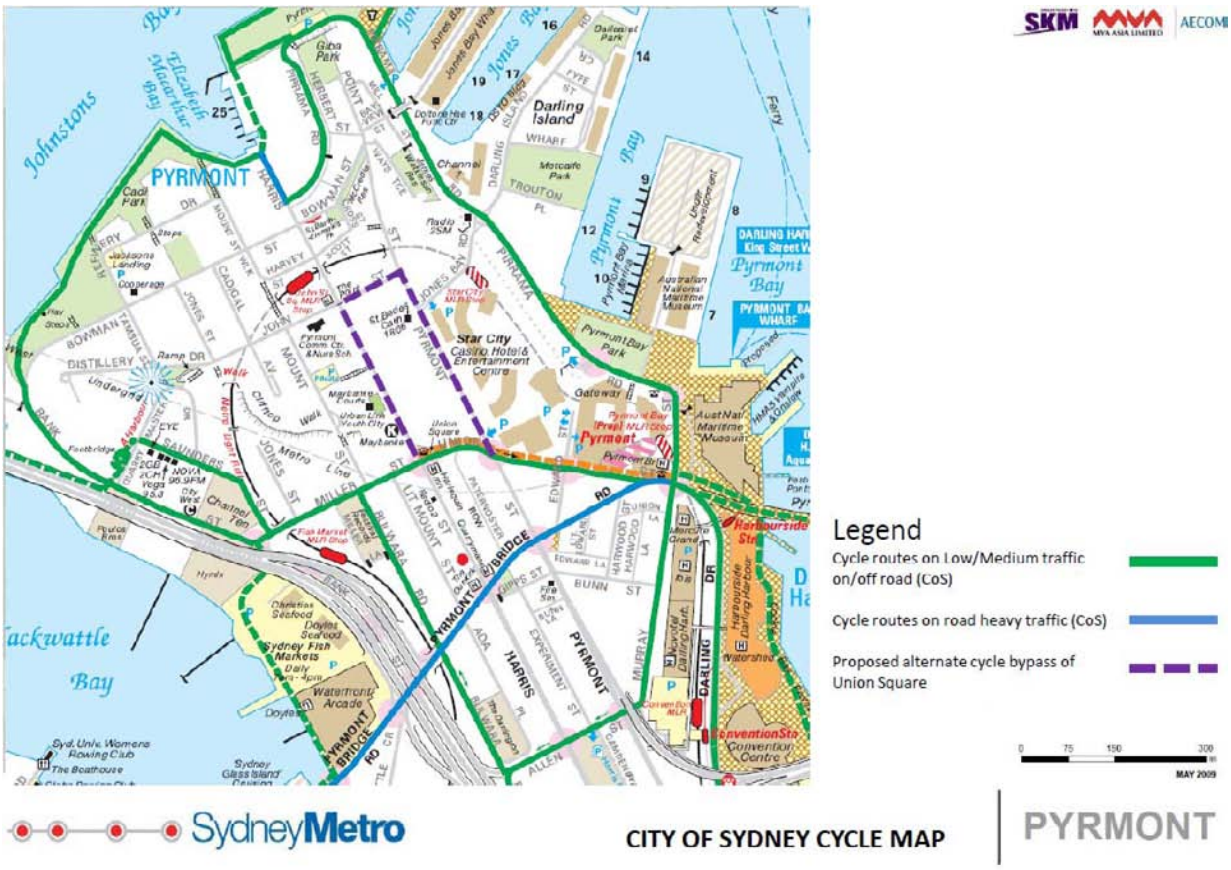
Existing pedestrian movements and cycle movements are high in this section of Union Square. Peak times for pedestrian movement occur in the morning, lunchtime and afternoon peak periods, when some 900, 690 and 830 pedestrians per hour (two way) use the square. Surveys of cycle movements

on Union Square during the morning and afternoon peak period indicates two way movements of some 300 cyclists in the AM peak and some 240 cyclists in the PM peak.

Alternate routes for cyclists were identified involving either Pyrmont Bridge Road or a more circuitous route via Pyrmont Street, Jones Bay Road and the existing foreshore cycle route on Pirrama Road to Pyrmont Bridge. Pyrmont Bridge Road may be utilised by experienced riders. However in the westbound travel direction, the absence of right turn storage facilities for turns off Pyrmont Bridge Road and heavy outbound traffic flows in the PM peak period, (which coincide with peak direction cycle movements) this route was not favoured

The alternate route illustrated in **Figure 4.3** requires a significant diversion via Harris Street (north), John Street and Union Street.

Figure 4.3: -Alternate Cycle Route -Pyrmont Station —Alternative 1



SOURCE: City of Sydney Cycle Map, Alternate route AECOM, August 2009.

4.9 Truck access for Pyrmont Station-Alternative 2

4.9.1 Truck access locations

Access to the worksites at Pyrmont under Alternative 2 is proposed as follows:

a) Western Site- Truck access to the western worksite is proposed via Mount Street (entry) and exit to Miller Street.
b) Eastern Site- Truck access is proposed from the northbound traffic lane of Pyrmont Street, drive through the worksite to continue northbound to Pyrmont Street.

4.9.2 Approach and departure routes for trucks

The approach route for all sites is proposed via the Anzac Bridge, off-loading to Pyrmont Bridge Road.

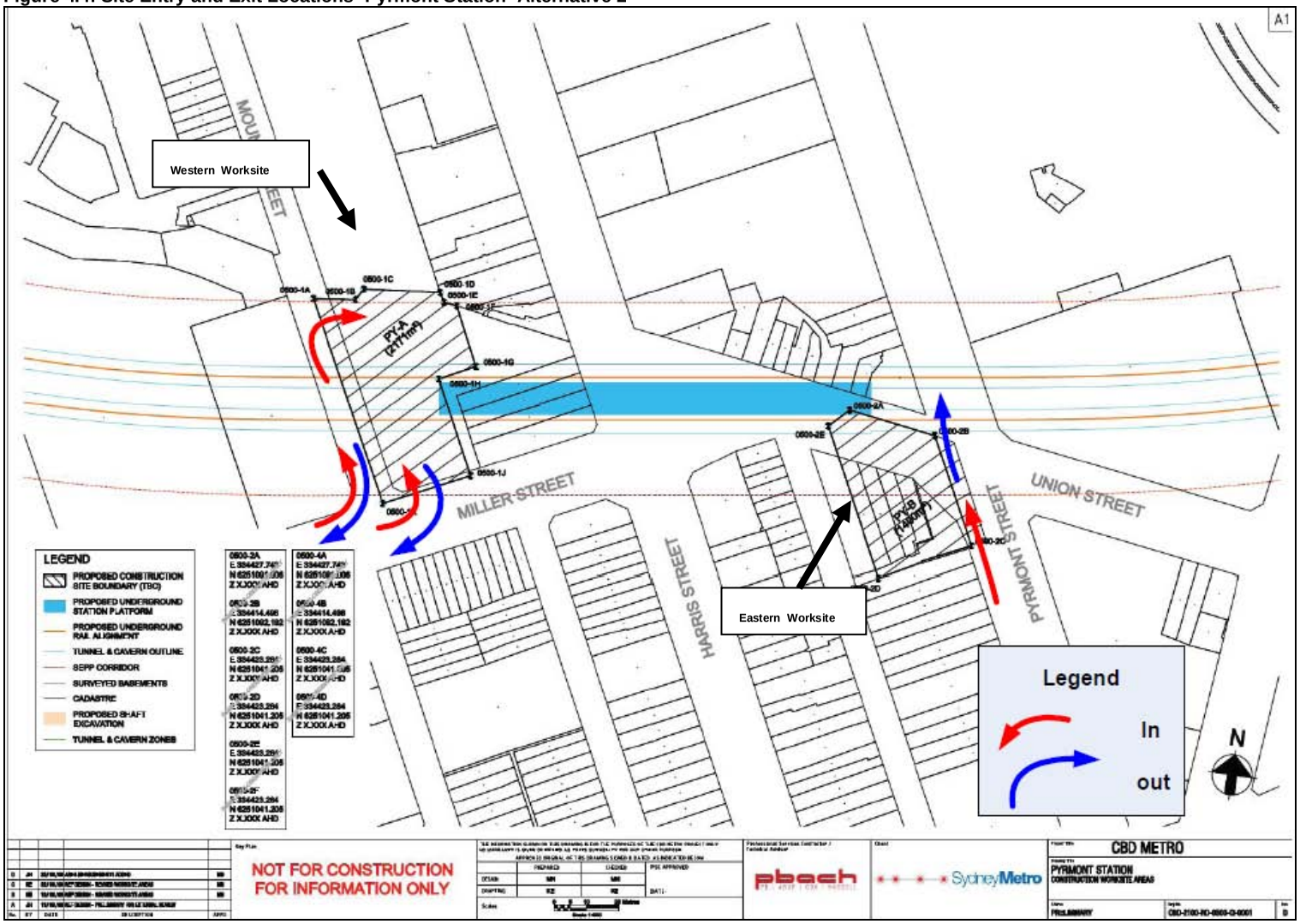
For the western site on Miller Street, drivers could use the underpass to loop back to Miller Street. An alternate route would be to off-load at Pyrmont Bridge Road and approach via Harris Street to Miller Street. Exiting trucks would use Miller Street to Harris Street, Pyrmont Bridge Road and on-load to the Western Distributor.

A similar approach route for the eastern site is proposed, approaching via Pyrmont Bridge Road to Pyrmont Street and entering the site via the northbound traffic lane on Pyrmont Street. Drivers would then exit to Pyrmont Street northbound, to John Street and Harris Street (southbound); and back to the Western Distributor via Pyrmont Bridge Road.

The access roadways are adequate for the medium size (approximately 10.5m length) truck envisaged to use the Pyrmont worksites.

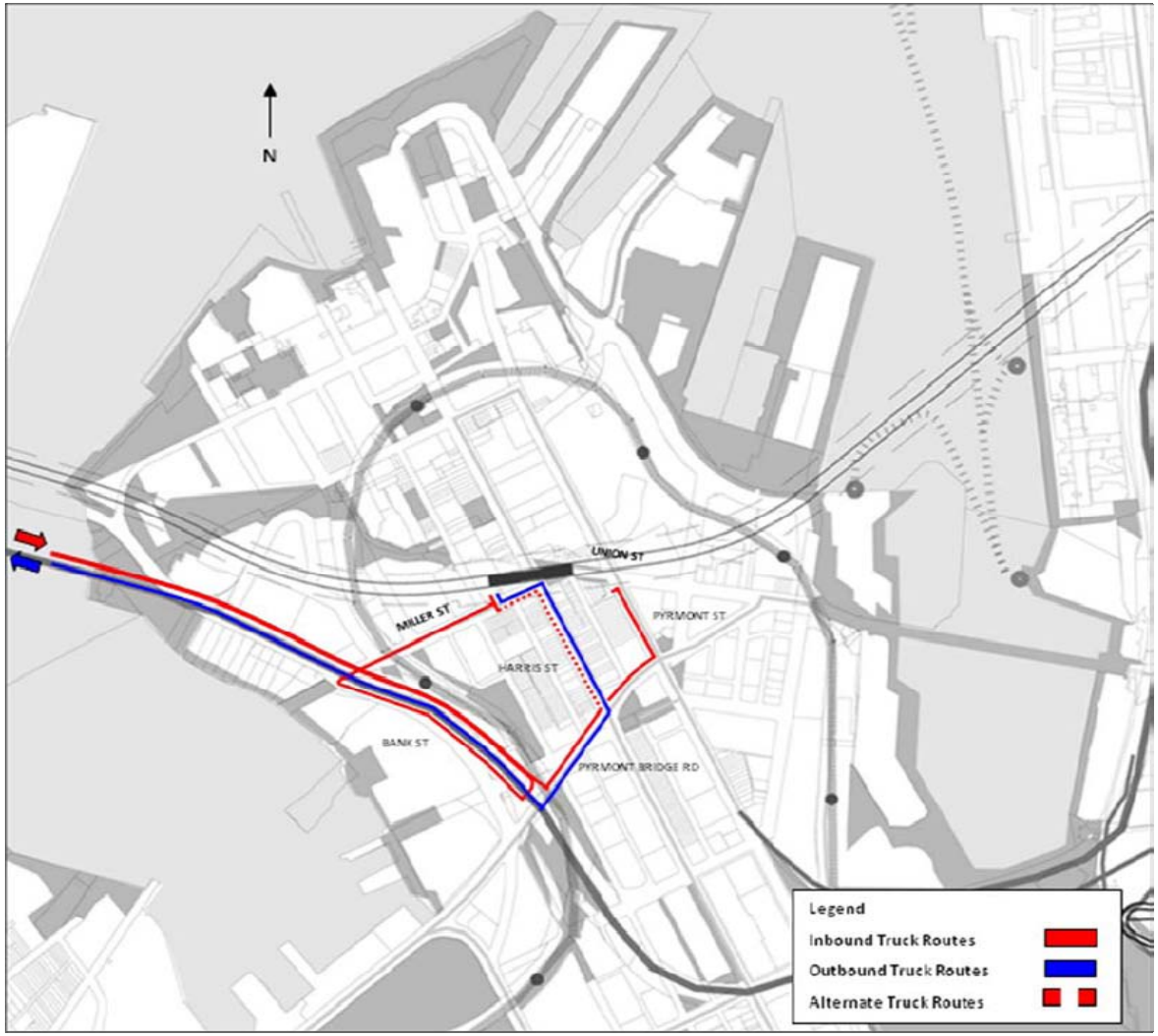
Figure 4.4 following shows the site access locations for Pyrmont Station- Alternative 2. While **Figure 4.5** following shows the truck approach and departure routes for Pyrmont Station-Alternative 2.

Figure 4.4: Site Entry and Exit Locations- Pyrmont Station- Alternative 2



Source: CBD Metro TA2100 and TA2108, 18 August 2009

Figure 4.5: -Truck Access Routes— Pyrmont Station- Alternative 2



Source: CBD Metro TA2100 and TA2108, 18 August 2009

4.10 Site management for Pyrmont Station- Alternative 2

4.10.1 Site access and security

The Pyrmont worksite(s) will be hoarded off and enclosed to provide public safety and site security, together with minimising noise impacts for neighbouring residents and businesses. Truck access locations will be gated with the gates remaining closed, when not required for truck entry/exit movements. This will mitigate impacts on pedestrian movement on frontage roads, in addition to the visual, dust and noise impacts of the work site(s).

Site access arrangements for Pyrmont Station- Alternative 2 are discussed in the following section.

4.10.2 Pedestrian access

4.10.2.1 Western worksite

The western worksite for Alternative 2 has the same affects on the Miller and Mount Street frontages with hoardings proposed to extend from the property boundary (existing building line) to the kerb line at the Miller Street frontage to permit site offices to be erected above the footpath and a reduction in the walkway width to 2.6m on Miller Street.

Further, as per the Alternative 1 site access, it is proposed to extend the site area across the Mount Street eastern footpath, requiring closure of the footpath for the duration of the works. Mount Street is a dead-end street serving local resident access and for access to existing commercial premises on the eastern side of the street, which will form the proposed worksite.

4.10.2.2 Eastern worksite

Pyrmont Street frontage

At the eastern worksite, it is proposed to close the western footpath of Pyrmont Street and divert pedestrians onto a path occupying part of the kerbside lane, which is currently utilised for parking on Pyrmont Street.

Due to the constrained site areas, truck access is proposed via the northbound traffic lane on Pyrmont Street, driving through the site and exiting northbound on Pyrmont Street.

The cross section on Pyrmont Street currently provides two traffic lanes and two parking lanes with a total road width of 12.8m. In order to accommodate the diverted pedestrian path and the truck access to the worksite, it is proposed to provide the following cross section:

Pyrmont Street Cross Section-Feature	Width
• Roadway for two lane, two way traffic:	7.0m
• Worksite hoarding:	0.2m
• Truck access laneway:	3.5m
• Barrier:	0.6m
• Pedestrian path:	1.5m
• Total width	12.8m

Existing pedestrian movements on the western footpath of Pyrmont Street are low with the majority of pedestrians following the Union Street alignment to Pyrmont Bridge and only local pedestrian access on Pyrmont Street, towards Pyrmont Bridge Road.

The diversion of the pedestrian path will require removal of some 20m (3 spaces) presently allocated for existing time restricted, authorised resident's vehicles excepted parking on the western side of Pyrmont Street. A further 50m (some 8 spaces) of time restricted parking would be removed from the eastern side to permit the through northbound and southbound traffic lanes on Pyrmont Street to be relocated adjacent to the eastern kerbline. This may inconvenience residents of terrace houses, with no off-street parking, facing the western side of Pyrmont Street.

4.10.3 Management of truck access at footpath crossings

The worksite locations will require trucks to cross existing footpaths on Mount Street / Miller Street / Pyrmont Street. From observation the footpaths are not as heavily used as CBD locations. However, within Union Square, peak times for pedestrian movement occur in the morning, lunchtime and afternoon peak periods, when some 900, 690 and 830 pedestrians per hour (two way) use the square, respectively.

All trucks will enter and exit the worksites in a forward direction to minimise potential pedestrian conflicts with drivers able to observe pedestrians.

4.10.3.1 Western worksite

Management of the driveway to Miller Street is proposed to reduce potential conflicts between pedestrians and trucks. This would take the form of swing or concertina gates and traffic controllers to stop pedestrian movement on the footpath and deter pedestrians from using the roadway. Potential conflicts are more likely in the morning, afternoon, midday peak periods and at weekends due to the Fish Market activity. At other times pedestrian movements on the northern footway are low.

4.10.3.2 Eastern worksite

Truck access under Alternative 2 is simplified with trucks approaching and departing from Pyrmont Street northbound.

Paternoster Row is currently one way northbound toward Union Square with exit available via Union Street to Pyrmont Street. Traffic that previously turned right out of Paternoster Row to exit to Pyrmont Street will now turn left to access Harris Street via Union Square for the duration of construction.

4.11 Management of pedestrian and cycle movements for Pyrmont Station-Alternative 2

For the eastern worksite, a minimum width of 5.0m is proposed between the building line of Pyrmont Street and the site hoarding, as per Alternative 1, in order to maintain pedestrian and cyclist access through Union Street.

This width is too narrow to accommodate existing pedestrian movements and a separated cycleway, therefore it will be necessary to delineate the space to allow safe shared use or control cycle movements (e.g. cyclists would dismount and walk).

4.12 Hours for truck movements

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, seven day week basis. Some adjustment to these standard project work hours may be considered by CBD Metro for the Pyrmont worksites.

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: Expected hours of work

Activity	Construction Hours	Comment/expectations
Below-ground construction activities		
Tunnelling	24 hours per day, six days per week	▪ Some activities that support tunnelling and fitout works may need to occur 24 hours per day, seven days per week ▪ Rock hammering in the tunnel between 10.00pm and 7.00am is likely to be precluded where it may impact on residential receivers
Construction of station caverns	As above	
Above-ground construction activities		
Construction Sites	Standard DECC construction hours	The following activities would be undertaken 24 hours per day, six days per week where noise impact management measures have been established: ▪ Surface works supporting underground construction (e.g. concrete pumping, truck loading) ▪ Excavation in hard ground Non-disruptive preparatory work, repairs or maintenance may be carried out on Saturday afternoons or Sundays between 8am and 5pm. 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.
Construction Traffic	24hours per day, 7 days per week	▪ 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. ▪ 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. ▪ Extended periods of localised lane and road closures would likely be required for safety purposes for the demolition of multi-storey buildings.

Source: CBD Metro July 2009

4.13 Truck movements associated with spoil excavation

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 27/07/09, 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

Location/ Activity	Excavation (m^3)	Average Production (m^3 per day)	Truck movements per day[1/2] (trips per day)	Average Truck Movements per hour[3] (trips per hour)	Maximum Truck Movements[4] (trips per hour)
Western Entrance Shaft					
Cut & cover	Soft:2,974 Rock:26,287	193 122	78 50	6 4	24
Mined tunnels	Rock: 2,322	23	10	1	24
Cavern & mined tunnels	Rock:35,893	334	134	9	24
Eastern Entrance Shaft					
Cut & cover	Soft: 2,069 Rock:18,169	193 68	78 28	6 2	24
Mined tunnels	Rock: 3,186	23	10	1	
Sub-Total - Soft	5,043	386	156	12	
Sub-Total - Rock	85,857	570	232	17	
Total	90,900	**NA**	**NA**	**NA**	**NA**

Source:

Source: Preliminary estimates of excavation , CBD Metro TA 2100, 27/07/09, based on spoil quantities as of 17/06/09. Preliminary estimates of truck movements per day and hourly truck movements, CBD Metro TA 2108 28/ 07/09, based on assumed average production rates (CBD Metro TA 210, 27/07/09) and daily truck movements.

Note:

1 Number of trucks per day estimated on the basis of $5m^3$ per single unit dump truck

2 Daily truck movements, assume each truck generates one inbound and one outbound movement or two trips.

3 Average truck trips per hour, based on one inbound and one outbound trip per truck over 15 hours per day.

4 Maximum truck trips per hour, based on the maximum throughput of one truck per 5 minutes and two trips per truck for larger sites and 5 trucks per hour for smaller sites.

4.13.1 Other activities generating truck movements

The estimated truck generation shown in **Table 4.2** is expected to be the period of maximum truck movements, however truck access will be also be required for demolition and IMO stages. Structural concrete and steel, plant and equipment, fittings and fixtures, escalators, and other engineering material will be required to be delivered to the site 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 are anticipated to generate lower numbers of truck movements than the peak movements associated with spoil removal.

4.14 Provision for over-dimensional vehicles

Procedures for over dimensional 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 restrictions on access routes and travel times, together with obtaining any prior approvals.

4.15 Spoil disposal locations and proposed haulage routes

Disposal locations for the excavated spoil have been identified as outlined in the CBD Metro 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 TMPs for individual sites.

4.16 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 Pyrmont 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, micro-tunnelling, 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.

4.16.1 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.

5.0 Management of Impacts and Mitigation Measures

5.1 Primary construction impacts

Primary impacts of construction under Pyrmont Station- Alternative 1 are envisaged to relate to:

- Impacts on pedestrian and cycle movements through Union Square, which is part of a cycle and pedestrian route between Anzac Bridge and the CBD;
- Impacts on cycle movements due to the proposed closure of the cycleway on Union Square and diversion via Pyrmont Street, (North) John Street, and Union Street. Alternate construction methodologies are being investigated to reduce the duration or avoid the need for this diversion.
- Limited impacts on footpath capacity due to hoardings extending over footpaths on Miller Street, Mount Street and Pyrmont Street;
- Truck access and pedestrian / cycle/ vehicular conflict management, notably in the vicinity of the Union Square at Paternoster Row intersection and at Harris Street intersection;
- Truck movements generated on Miller Street, Pyrmont Street and Harris Street, between Pyrmont Bridge Road and Miller Street;
- Local access and traffic diversions, i.e. Paternoster Row and Union Square/ Pyrmont Street;
- Pedestrian re-routing and diversions primarily on Union Square and to a lesser extent on Mount Street; and
- On-street car parking displaced from Mount Street and Union Street.

Primary impacts of construction under Pyrmont Station- Alternative 2 are similar to Alternative 1, with further impacts on Pyrmont Street, due to the proposed expanded eastern worksite.

Under Alternative 2 the proposed eastern worksite requires closure of the western kerbside lane of Pyrmont Street for pedestrian diversion and truck access, altered configuration of through traffic lanes on Pyrmont Street; generating additional impacts in relation to:

- The alignment of traffic lanes on Pyrmont Street, south of Union Street modified to provide a two lane two way section adjacent to the eastern kerbside, site hoarding, truck access and pedestrian path within the existing road reserve;
- A reduction in on-street parking on Pyrmont Street, with some 20m (3 spaces)of existing time restricted parking proposed to be removed from the western kerbside and some 50m (some 8 spaces) from the eastern kerbside;
- Truck movements generated on Pyrmont Street, north of Union Street, John Street and Harris Street, in addition to Pyrmont Bridge Road and Miller Street.

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 need to allow for emergency vehicles (Fire Brigade has the largest vehicle size) on Mount Street to access the adjacent residential unit development on the southern side of the street has been identified. This may involve both the vehicle but also ladder/ snorkel for evacuation of adjacent building, i.e. width requirements may be greater than just the vehicle width to accommodate stabilisers.

5.2.2.1 Size of emergency vehicle

Fire Brigade vehicles with aerial ladders conform to the general truck width of 2.5m, (11.7m length, max 12.4m and 3.8m height), although the maximum turning circle of up to some 29m (wall to wall) for the largest appliance is relatively large.

5.2.2.2 Emergency vehicle access to Mount Street

Emergency vehicle access to premises on Mount Street may be required for the residential units (4 levels above ground) on this frontage, where evacuation via balconies or windows facing Mount Street is required. The minimum access width for general appliances is for 4.0m (between kerbs) increasing to 6.0m min for aerial appliances. This width would increase to about 4.5m due to the hoarding on the eastern side.

Allowing for the stabilisers to extend onto the western footway, the width of road way required to be maintained would be in the order of 5.0m min between kerb and hoarding (including 500mm offset), i.e. to accommodate the total 6m width for an aerial appliance.

Height clearance above the access way of 4.5m is required for normal operation. However, height requirements for the ladder, e.g. 3.8m (unextended), up to 37m (extended) would require a clear height to be maintained over the pedestrian path and road.

Fire Bridge officers were not directly consulted regarding their site specific requirements. In addition, the location of fire hydrants and access requirements have not been established. These aspects will be addressed in the CTMPs.

5.2.2.3 Access to Union Street and Union Square

The section of roadway Union Street adjacent to the Eastern Worksite, between Paternoster Row and Pyrmont Street would be reduced to 4.0m width.. This width will not permit access for Fire Brigade vehicles.

Access for small Fire Brigade vehicles would be available via Paternoster Row, the cycle path from Harris Street and from the Pyrmont Street frontage. In view of the short section (some 35m length) of street involved and ability to operate from either end, this may be operationally acceptable, subject to consultation with the Fire Brigade and details of the proposed arrangements in the addressed in the CTMPs.

5.2.3 Events

The CBD is impacted by several significant events, which affect visitor numbers on city streets, but are generally of limited duration. Pyrmont Peninsular being on the western fringe experiences less significant increases in pedestrian and traffic activity.

Events at Darling Harbour, notably Australia Day generate increased demand for parking (and associated vehicle movements) at the Darling Harbour car parks, together with increased pedestrian movements. Star City Casino is a significant generator of car/ taxis /coach activity, which increases during holidays and with performances at the Lyric Theatre and other attractions.

Potential issues are associated with construction activities affecting pedestrian footway capacity, car park access and bus services, together with noise and vibration sensitivities for occasions such as Australia Day. These potential impacts will need to be managed by the CBD Metro contractor (s) to avoid or mitigate impacts and in accordance with any RTA / Council approval conditions.

5.3 Pedestrian management

5.3.1 Site access management

Pyrmont Station –Alternative 1

The worksite locations on Pyrmont Street, Union Square and Miller Street, will require trucks to cross footpaths. At peak times in the morning, lunchtime and afternoon peak periods, management of the driveway access to reduce potential conflicts between pedestrians and trucks is proposed. This would take the form of swing or concertina gates and traffic controllers to stop pedestrian movement on the footpath and deter pedestrians from using the roadway.

Management of the Pyrmont Street access and particularly the exit through Union Square will be required in peak periods and monitoring for the remainder of truck operating hours. The shared use of the section of cycleway between Paternoster Row and Harris Street will require trucks to give way to oncoming cyclists. Currently this section is signposted for 'No Entry, Cyclists Excepted', although garbage collection vehicles were observed within this section and the available width between kerb and bollards, permits truck access.

At peak times in the morning, lunchtime and afternoon peak periods, traffic control will impact on the pedestrian capacity and amenity for Union Square. Truck movements to the eastern worksite should therefore ideally be reduced during these times.

Paternoster Row, which is currently one way northbound toward Union Square would continue to operate with one way exit to Pyrmont Street, although the available road width would be reduced. Stop control for traffic exiting Paternoster Row to Union Street would require this traffic to give way to exiting trucks from the worksite. However these exiting movements should be under traffic control due to the restricted visibility due to buildings at the Union Street corner.

Pyrmont Station –Alternative 2

The western worksite for Alternative 2 has the same affects on the Miller and Mount Street frontages with hoardings proposed to extend from the property boundary (existing building line) to the kerb line at the Miller Street frontage to permit site offices to be erected above the footpath

Further, as per the Alternative 1 site access, it is proposed to extend the site area across the Mount Street eastern footpath, requiring closure of the footpath for the duration of the works. Mount Street is a dead-end street serving local resident access and for access to existing commercial premises on the eastern side of the street, which will form the proposed worksite.

At the eastern worksite, it is proposed to close the western footpath of Pyrmont Street and divert pedestrians onto a path occupying part of the kerbside lane, which is currently utilised for parking on Pyrmont Street.

Due to the constrained site areas, truck access is proposed via the northbound traffic lane on Pyrmont Street, driving through the site and exiting northbound on Pyrmont Street. A barrier between the proposed truck lane and pedestrians will reduce potential conflicts.

The through traffic lanes on Pyrmont Street will be aligned in order to accommodate the diverted pedestrian path and the truck access to the worksite.

5.3.2 Impact on existing pedestrian and cycle network for Pyrmont Station-Alternative 1

5.3.2.1 Eastern worksite

The Eastern Worksite on Union Street will reduce the available walkway width to about 4.0m on the northern footpath on Union Street. Removal of street furniture and trees, as shown in **Photograph 5.1** following, will be required.
An assessment of the required walkway width requirements indicates that a 2.0m width will be adequate to accommodate two way pedestrian flows. This would leave a 2.0m width for the existing outdoor seating area.

Photograph 5.1: Union Street northern footpath looking west near Pyrmont Street corner

Pedestrian capacity has been estimated based on Highway Capacity Manual 2000 (HCM) methodology for walkways of total width of 3.0m to 4.0m. The following assumptions were adopted:

1) Effective walkway width = Total width less shy line effect for walls, kerb and outdoor seating.
2) Level of Service C is a desirable objective, based on hourly pedestrian flows. Higher flows (as illustrated under Level of service D to E) may be achieved in individual, short term peaks within the hour.

The resultant capacities, expressed in pedestrians per minute per metre, at Level of Service C to E are shown in **Table 5.1**. An allowance has been included for platooning of pedestrians due to the signalised pedestrian crossings of Harris Street and Pyrmont Street. The resultant capacities for effective walkway widths of 2.0m to 3.0m are shown in **Table 5.1** and **Table 5.2** following.

Table 5.1: Pedestrian Flows for Level of Service

Level of Service for walkways	Flow Rate[1] p/min/m	Flow Rate[2] p/min/m (Incl platooning)	Flow Rate[3] p/hour/m (Incl platooning)
C	23-33	10-20	600-1,200
D	33-49	26-36	1,560-2,160
E	49-75	36-49	2,160-2,940

Source: HCM, Chapter 18.

1. Flow rate is measured in pedestrians per minute per metre.
2. Flow rate including platooning, provides an allowance for platooning of pedestrians due to signal operation/ bus stops on Castlereagh Street.
3. Flow rate (including platooning) converted to hourly flow per metre.

Table 5.2: Pedestrian Flows for Design Level of Service C

Level of Service for walkways	Flow Rate[1](p/hr/m) For Effective Walkway Width[2](m)	
	2.0m	3.0m
C (including platooning)	1,200-2,400	1,800-3,600
D (including platooning)	3,120-4,320	4,680-6,480

Source: HCM, Chapter 18.

1. Flow rate is measured in pedestrians per hour at the nominated walkway width.
2. Effective walkway width allows for total width less clearances to kerb, seating walls .

The analysis indicates that the effective walkway width of 2.0m would be adequate to the existing peak pedestrian movements within Union Square, i.e. some 900, 690 and 830 pedestrians per hour in the morning, lunchtime and afternoon peak periods, respectively. The capacity of pedestrian pathways and in particular at any localised narrowing, e.g. adjacent to table and chairs, planter boxes, trees etc, would need to be assessed further, as part of the development of detailed TCPs under the CTMP

The worksite will be enclosed to minimise impacts on adjacent businesses and residences, with truck access managed by traffic controllers. Gates would generally remain closed to mitigate the impacts of construction noise and vibration. This aspect will be addressed by others as part of the environmental impact assessment.

This will generally mitigate impacts on pedestrian movement on Union Street. However it is noted that the reduction in footpath width would mean pedestrians will be closer to the outdoor seating area hoarding and building frontages.

Pedestrians on the northern section of Union Square will be largely unaffected; however traffic movements will increase, due to one way westbound traffic from Paternoster Row. This traffic will be slow moving and the majority will be resident's vehicles.

For the eastern worksite, a minimum width of 4.0m is proposed between the building line of Pyrmont Street and the site hoarding. This width is considered too narrow to accommodate existing pedestrian and cycle movements past the worksite.

Existing pedestrian movements and cycle movements are high in this section of Union Square. Alternate routes for cyclists were identified involving either Pyrmont Bridge Road or a more circuitous route via Pyrmont Street, Jones Bay Road and the existing foreshore cycle route on Pirrama Road to Pyrmont Bridge.

Pyrmont Bridge Road may be utilised by experienced riders. However in the westbound travel direction, the absence of right turn storage facilities for turns off Pyrmont Bridge Road and heavy outbound traffic

flows in the PM peak period, (which coincide with peak direction cycle movements) this route was not favoured.

5.3.2.2 Western worksite

For the worksites on Mount Street, pedestrian volumes are low and the existing western footpath is considered to provide adequate footpath capacities, past the worksite.

At the Miller Street frontage, the effective walkway width of about 1.9m (existing 3.4m width, less hoarding extension 500mm, less clearances of 1.0m, i.e. 500mm each for support posts and hoarding) is envisaged to provide adequate capacity.

5.3.3 Impact on existing pedestrian and cycle network for Pyrmont Station-Alternative 2

5.3.3.1 Eastern worksite

The Eastern Worksite on Union Street will have the same effect as Alternative 1 in the reduction in footpath width at the Union Street frontage to about 4.0m on the northern footpath on Union Street requiring the removal of street furniture and trees, as previously identified.

Similarly, alternate routes for cyclists, involving either Pyrmont Bridge Road or a more circuitous route via Pyrmont Street, Jones Bay Road and the existing foreshore cycle route on Pirrama Road to Pyrmont Bridge, will be required.

Pedestrians on the western footpath of Pyrmont Street approaching Union Street will be diverted on a 15.m wide path utilising part of the existing kerbside parking lane. The low existing pedestrian movements on this footpath are envisaged to be adequately accommodated within the reduce width of path.

5.3.3.2 Western worksite

The western worksite for Alternative 2 has the same affects as Alternative 1, on the Miller and Mount Street frontages.

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

Traffic control at times of truck entry and exit movements will permit pedestrian movement to be monitored and avoid unsafe conflicts at footpath crossings.

The pedestrian walkways at site frontages will be maintained without obstruction e.g. due to hoarding footings, posts and trip hazards. In addition, lighting of the walkways, where necessary for night-time security due to the length of covered walkway, will be provided.

Pedestrian signage and reflective tape at entries / hoardings to alert pedestrians to the appropriate path and obstructions such a support posts will be provided. Consideration should be given to tactile pavement marking to guide visually impaired pedestrians around potential obstructions or conflict points.

5.4 Servicing

5.4.1 On-street servicing

No on-street loading spaces are affected by the proposed worksites.

Pyrmont Station- Alternative 1 and 2 will result in existing premises on Union Street adjacent to the eastern work zone will be affected by the loss of some five on-street meter parking. Alternate on-street loading and parking spaces for service vehicles are available on Pyrmont Street and Harris Street.

Heavy vehicle servicing would be subject to detailed consideration in the CTMP.

5.5 Provision for adjacent development

5.5.1 Western worksite

Development of vacant land located north of Union Street between Pyrmont and Union Street by Star City Casino may coincide with construction at CBD Metro Pyrmont Station worksites. The self contained, enclosed nature of the Metro construction sites will reduce any potential cumulative impacts of concurrent development activity. However, the CBD Metro contractors and Star City contractors will need to co-ordinate activities to reduce mutual impacts, e.g. delays or disruption.

Redevelopment sites for Pyrmont, (based on approved developments from City of Sydney, Commercial Development Monitor, December 2008) are distant from the subject work sites, and unlikely to be impacted.

Existing residential unit development on the western side of Mount Street will be impacted by the proximity of the western worksite, given the proposed erection of the hoarding at about 4.5m off the existing kerbline and narrow western footway on Mount Street. These impacts will be addressed in the environmental assessment and in future by the CBD Metro contractors, once appointed.

5.5.2 Eastern worksite

No physical alteration to existing adjacent premises is proposed. However the outdoor tables and chairs within the footway for the existing café on Union Street will be impacted under both Pyrmont Station – Alternative 1 and 2, by the proposed reduction in footway width on Union Street. These impacts are being addressed in the environmental assessment

5.5.3 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.

Given the limited impact on lane and parking arrangements resulting from the construction of the Pyrmont Metro Station, there do not appear to be any specific locations where cash in transit arrangements would have to be modified.

Regardless of this TMP making no specific provision for changed access arrangements, it will be the responsibility of the cash in transit companies to determine how best to respond to any change in access arrangements to ensure the security of their operations. Any liaison required should be directed through the TTLG.

5.6 Cycle route and access

The existing two-way cycle way on Union Street is proposed to be maintained. Traffic exiting Paternoster Row and trucks exiting the eastern worksite to Harris Street will share the existing cycle path, however this traffic will be slow moving proposed to be managed by traffic controllers.

5.7 Bus routes and stops

No change to existing bus stop locations or routes is proposed for the majority of construction. The existing bus stop on Miller Street will be located at the site frontage and just to the north of the truck access driveway.

Minor impacts due to friction created by trucks merging or crossing into Miller Street are envisaged to be manageable. The additional volume of vehicles using Miller Street and Harris Street is minor, relative to existing traffic flows, the exact impacts are being quantified through network modelling.

5.8 Coaches

No impact of existing conditions for coaches is envisaged.

5.9 Taxis

No change is proposed to the taxi ranks or access routes are envisaged to be minimal and related to residual impacts of a minor increase in travel time and friction.

5.10 Kiss and Ride

No impact on existing conditions for kiss and ride is envisaged.

5.11 Parking

5.11.1 Pyrmont Station-Alternative 1

The through eastbound traffic lane and on-street parking for some five meter spaces on Union Street will be removed, in order to maintain the two way cycle lane. This is envisaged to have minor overall impact, due to the level of parking available in nearby Pyrmont Street and Harris Street, customers of adjacent businesses Union Street will have reduced convenience.

Paternoster Row, which is currently one way northbound toward Union Square would continue to operate with no impact on parking and one way exit to Harris Street, during construction.

5.11.2 Pyrmont Station-Alternative 2

Similarly to Alternative 1 on-street parking for some five meter spaces on Union Street will be removed.

At the Pyrmont Street frontage, a reduction in on-street, time restricted (resident excepted) parking of some 3 spaces on the western side and 8 spaces on the eastern side is envisaged, due to the alignment of through traffic lanes, diversion of the pedestrian path and truck access. Site observation indicates overall parking availability on Pyrmont Street, however terraces on the western side of Pyrmont Street have no/ limited off-parking.

5.12 Traffic

5.12.1 Vehicle speeds

No changes to existing speed limits are proposed. The need for changes to the existing speed zoning may occur with development of the detailed traffic control plans as part of the CTMP. Any change would be subject to the Road Occupancy Licence and Speed Zoning Authorisation approval procedures.

5.12.2 Road network changes

The changes to Union Street will alter existing access options, some property access and egress points, and displace parking.

Assessment of the network performance has based on the cumulative impacts of the CBD Metro worksites and will be separately reported, rather than assessing the individual site impact..

5.12.3 Intersection operation

No change to the operation of existing intersections is proposed.

Truck egress from the Eastern Worksite is proposed via the existing Harris Street and Miller Street intersection, with trucks required to give way to pedestrians on the footpath and traffic on Harris Street and Miller Street.

5.12.4 Freight and commercial vehicles

Minor impact on servicing for existing businesses within Union Street / Union Square may occur, however no significant impacts are anticipated.

5.12.5 Impact of construction traffic on frontage roads

The forecast truck movements, relative to the existing flows on frontage roads, are presented in the following **Table 5.3** for Pyrmont Station-Alternative 1. Similar, impacts are envisaged for Alternative 2, except at the eastern worksite, where trucks egress northbound on Pyrmont Street to Jones Street and Harris Street.

Table 5.3: Summary of Increased Traffic and Frontage Roads to Construction

Frontage Road	Existing Traffic Flows			Forecast Truck movements		
	Average Daily Flow	AM Peak Hour	PM Peak Hour	Average Daily Flow[1]	AM Peak Hour[2]	PM Peak Hour[2]
Union Street	NK			88 in 88 out	4 in 3 out	4 in 3 out
Harris Street	6,000	600[3]	600[3]	88(out)	3	3
Increase (%)				1.5%	0.5%	0.5%
Miller Street	1500	96	95	111 in 111 out	8 in 8 out	8 in 8 out
Increase (%)				7.4%	8.3%	8.4%
Pyrmont Street	8,400	800[3]	800[3]	88 in	4 in	4 in
Increase (%)				1.1%	0.5%	0.5%

Note:

1 Daily truck movements assume each truck generates one inbound and one outbound trip. Average daily flow is the sum of the maximum number of truck movements by construction phase at the worksite, e.g. cut and cover, cavern excavation, entrance shaft mined tunnel, derived from Table 4.2

2 Average truck trips per hour, based on 15 hours per day for truck movements

3 Peak hour flows indicative only, based on the assumption that peak hour represents 10% of daily flow

The preceding table illustrates the relatively small proportional increase in existing traffic flows; the more significant increase occurring on Miller Street. However Miller Street and Harris Street are operating within capacity, although subject to the constraint of bus stops, parking and intersection operation, affecting capacity. The network impacts of truck traffic and cumulative impacts of multiple sites are being assessed and will be separately reported.

5.13 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. Further analysis with the assistance of the Paramics models will be undertaken to define impacts and preferred mitigation measures.

5.13.1 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.

5.14 Summary of traffic and pedestrian impacts

There are no major network adjustments resulting from this Plan.

However there are primarily pedestrian, cycleway, local residential access, property access and parking impacts, under Pyrmont Station Alternative 1, which are:

- A reduction in the foot path width on the northern side of Miller Street to an effective width of about 1.9m, due to erection of hoarding and support posts for site sheds over the footpath;
- Closure of the eastern footpath and part of the roadway on Mount Street to accommodate expansion of the Western worksite.
- Removal of kerbside parking for some six cars on the western side of Mount Street to maintain a minimum width of 4.5m wide traffic lane for access to the worksite;
- Closure of the eastbound traffic lane on Union Street between Paternoster Row and Pyrmont Street to accommodate expansion of the Eastern worksite;
- Closure of the cycle lane on Union Street between Paternoster Row and Pyrmont Street and significant diversion of the cyclepath for access to Pyrmont Bridge.;
- Closure of part of the western footway on Pyrmont Street, south of Union Street (effective width of about 2.1m to accommodate expansion of the Eastern worksite;
- Diversion of traffic exiting Paternoster Row westbound to Union Street to Harris Street. Currently traffic from Paternoster Row exits via Union Street eastbound to Pyrmont Street; and
- Removal of existing kerbside parking for some five meter spaces on the northern side on Union Street and reduction in the width of the northern footpath. The removal of trees, street furniture and outdoor seating is addressed separately in the environmental assessment.

The same impacts are envisaged under Pyrmont Station Alternative 2, however with additional impacts on pedestrians and parking impacts at the Pyrmont street frontage, which are:

- Diversion of the existing pedestrian footpath on the western side of Pyrmont Street south of Union Street and a reduction in width to 1.5m, utilising part of the existing kerbside parking lane;
- Removal of existing kerbside parking for some three time restricted parking spaces on the western side on Pyrmont Street and some eight time restricted parking spaces on the eastern side

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 provides an outline of proposed methods for the provision of a safe and effective local road network management throughout all stages of construction. The TMP will be further developed by the CBD Metro contractors once appointed.

6.1 Compliance with Director General's 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
Key issues	**General Construction Impacts** –	
	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:	Framework Traffic Management Plan.
	• construction noise and vibration, including a considered approach to scheduling construction activities including transport, blasting and tonal or impulse noise generating works).	Noise Assessment (by others) Construction Plan (by others)
	• construction traffic including a considered approach to route identification and scheduling of transport movements, having regard to	This Pyrmont Station-Traffic Management Plan. Construction Plan (by others)
	- Alternatives to road transport;	- Section 4
	- The number, frequency and size of construction related vehicles (both passenger, commercial and heavy vehicles);	- Section 4
	- The nature of existing traffic on construction access routes (with consideration of peak traffic times and sensitive road users, including emergency vehicles and buses)	- Section 5
	- The need to close, divert or otherwise reconfigure elements of the road network associated with construction of the project; and	- Section 5 and separate assessment report by others.
	- 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)	

Requirement	Condition Requirements	Reference
	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. • Spoil management • Water Impacts	Framework Traffic Management Plan. This Pyrmont Station-Traffic Management Plan. Construction Plan (by others) Framework Traffic Management Plan. Construction TMP (by others)
Consultation	The EA must reflect an appropriate and justified level of consultation with relevant parties during the preparation of the EA, including: • 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; • the public, including specialist interest groups and affected landowners. • 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).	Framework Traffic Management Plan This Pyrmont Station-Traffic Management Plan.

Appendix A – Kerbside Changes

Table 5: Pyrmont Station

Station	Worksite	Location	Existing Kerb Use	Proposed Changes to Kerbside Parking restrictions	Loss of Loading / Parking and duration		Mitigation Strategy
					Enabling	Construction	
Pyrmont	Eastern	Pyrmont Street, south of Union Street	No Stopping/Time restricted parking(4spaces)	Existing parking removed to provide construction zone at site establishment	5 spaces Site establishment	No Change	Nil
	PY-B	Union Street between Paternoster Row and Pyrmont Street,	Ticket parking (5 spaces)	Existing ticket parking (5 spaces) replaced with relocated bicycle lane	5 spaces Duration of works	5 spaces Duration of works	Nil
	Western PY-A	Mount St west side north of Miller St	Time restricted parking (6 spaces)	Existing parking (6 spaces)for existing residents/ visitors and businesses on eastern side of Mount St	6 spaces On-street parking removed. Duration of works	6 spaces On-street parking removed. Duration of works	Demand reduced due to worksite occupying businesses on eastern side of Mount St

Figure 5.1: Existing kerbside parking allocation

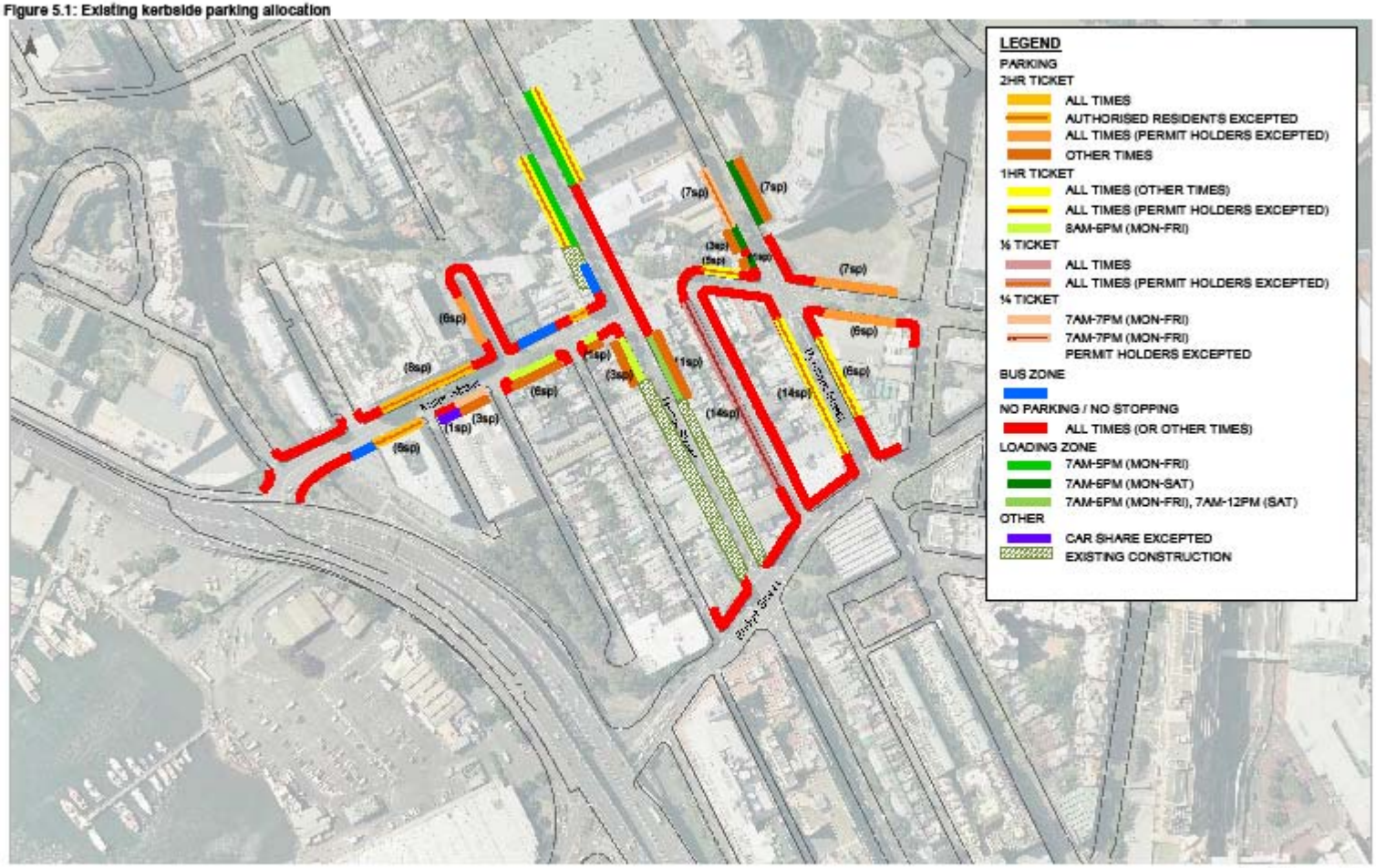


Figure 5.2: Proposed worksites and changes to kerbside parking allocation

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