

Appendix G **Town Hall Traffic Management Plan**





CBD Metro TA 2108 Transport and Access Advisor

Town Hall Station – Traffic Management Plan

Sydney Metro

24 August 2009

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Town Hall Station – Traffic Management Plan

Prepared for

Sydney Metro

Prepared by

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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 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.
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		The agreement between the project company and the

Term	Acronym / Abbreviation	Description
contract		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.
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

Term	Acronym / Abbreviation	Description
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.
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.

Term	Acronym / Abbreviation	Description
Variable Message Sign	VMS	Portable variable message signs are trailer mounted electronic signs used to display traffic messages to motorists. Permanent Variable Message signs are large gantry signs permanently installed at the side of the road which are owned and operated by the RTA.

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 Town Hall Station 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 feasible traffic management scenario.

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

The following represent the major network adjustments and traffic impacts that will result due to Town Hall construction sites:

- Driveway access points into worksites;
- Use of traffic controllers to facilitate entry/exit to the Bathurst Street and Pitt Street worksites resulting in minor delays to traffic in Bathurst and Pitt Streets;
- Temporary road occupancy in Pitt Street north of Park Street (outside of peak periods) or alternatively a full time road occupancy with one single northbound lane retained with conversion of northbound left and through shared lane to a left only lane;
- Temporary road occupancy in Pitt Street north of Bathurst Street (west side at Pitt-Bathurst worksite) and possible diversion of pedestrians via western carriageway or eastern footpath;
- Pedestrian control gates to facilitate trucks crossing footpaths resulting in minor delays to pedestrians whilst trucks are accessing and egressing worksites;
- Changes to parking, loading and other kerbside uses adjoining the worksites and on approach roads for the duration of work;
- Increase of up to a maximum of 2% and average of 0.8%, in traffic volumes adjacent to the worksites due to construction traffic;
- Potential short term closure of the western footpath in Pitt Street, for approximately 50m to the north of Park Street; and
- Localised reduction in footpath widths in the vicinity of the worksites.

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

- Use of Traffic Control to manage vehicle and pedestrian movements where required;
- Truck size limited to single tipper configuration for spoil movement;
- Pedestrian movements to be controlled during daytime and busy evening periods while trucks crossing footpaths; and
- Truck routes have been selected that result in a minimum of disruption to bus and other critical CBD corridors.

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:

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

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

The Town Hall Metro Station is located in the mid city, close to Town Hall CityRail station and adjacent to the proposed Mid-City Bus interchange in Park Street which will provide a location for buses from Victoria Road to terminate prior to laying over in the Domain, as well as an enhancement of the MetroBus to include 4 new routes, all of which will interchange in the vicinity of Park Street.

The Metro Station would be located under Pitt Street, approximately between Park and Bathurst Streets.

Figure 1.1 and **Figure 1.2** shows the location of the permanent worksites associated with construction of the Metro Station.

Figure 1.1: Location of Town Hall Metro Station in context of Sydney CBD

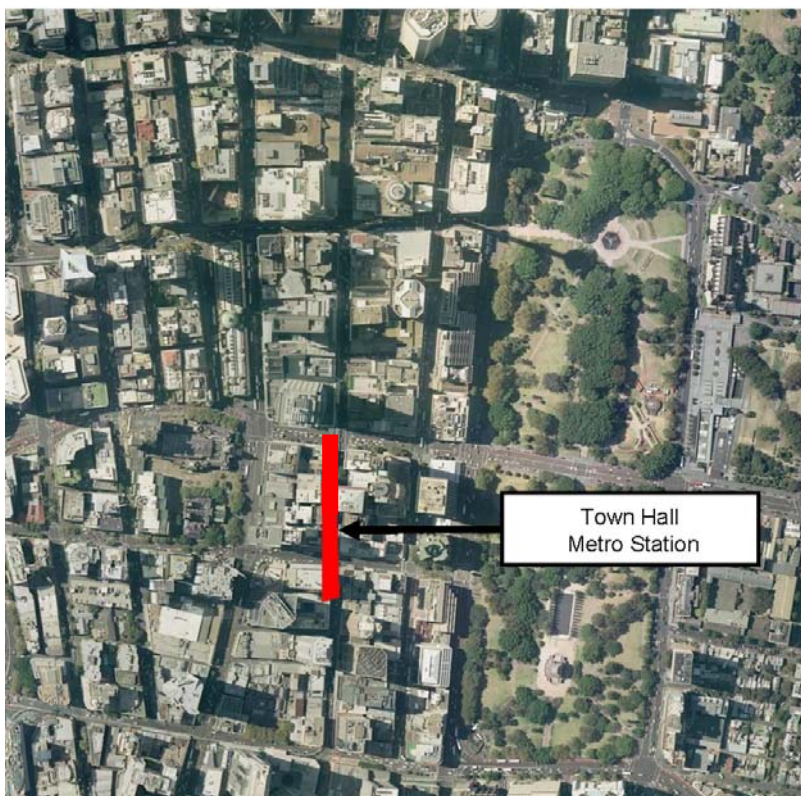
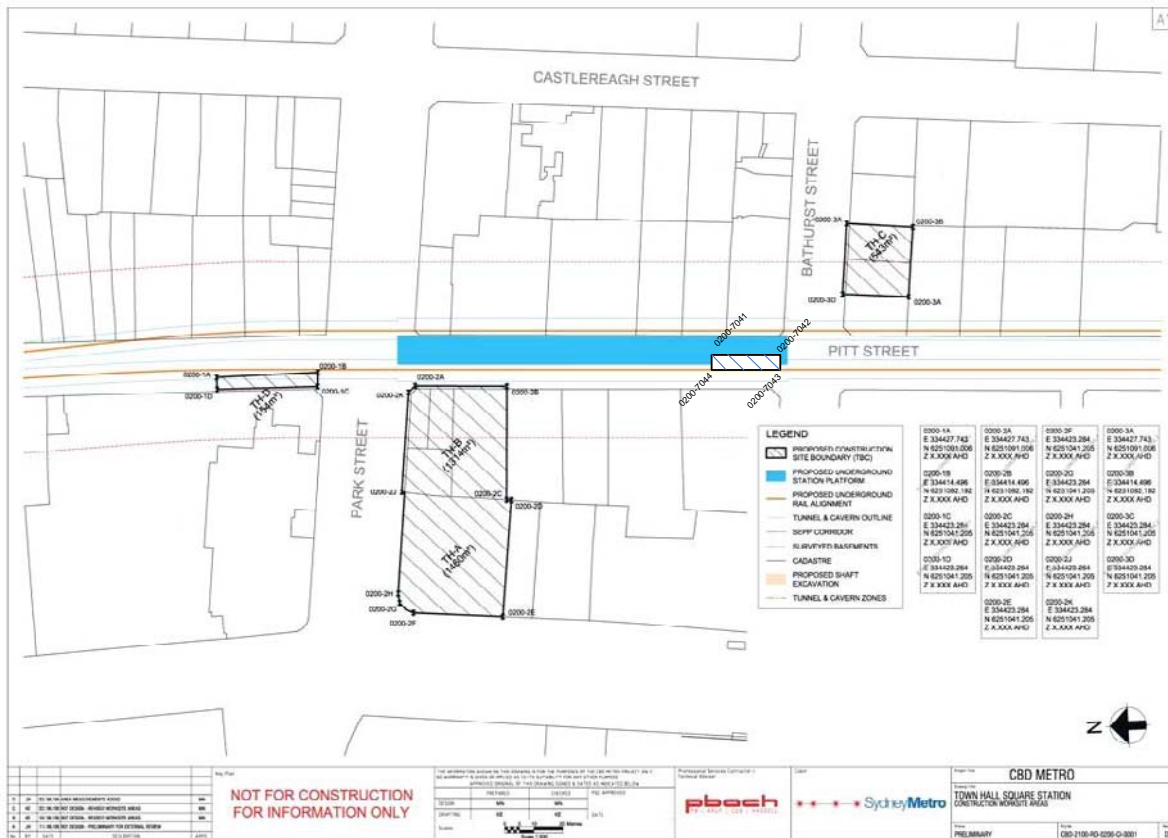


Figure 1.2: Town Hall Station Worksite Locations



Source: CBD Metro, June 09.

1.2 Scope of this plan

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

This TMP contains information about:

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

The TMP has been prepared through a consultative process with relevant stakeholders. However it is noted that further detailed consultation with all stakeholders, subsequent changes to construction methodology including those developed by the successful construction contractor/s and development of this plan may require alternate traffic impacts and revisions to the management arrangements proposed.

This TMP operates under the Framework Traffic Management Plan (FTMP), which covers traffic management responses and strategic processes, which are common to all work sites, to enable construction of the CBD Metro.

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

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

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

The Traffic Management Plan hierarchy is as follows:

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

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

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

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

1.3 Report structure

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

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

2.0 Existing Situation

2.1 Transport

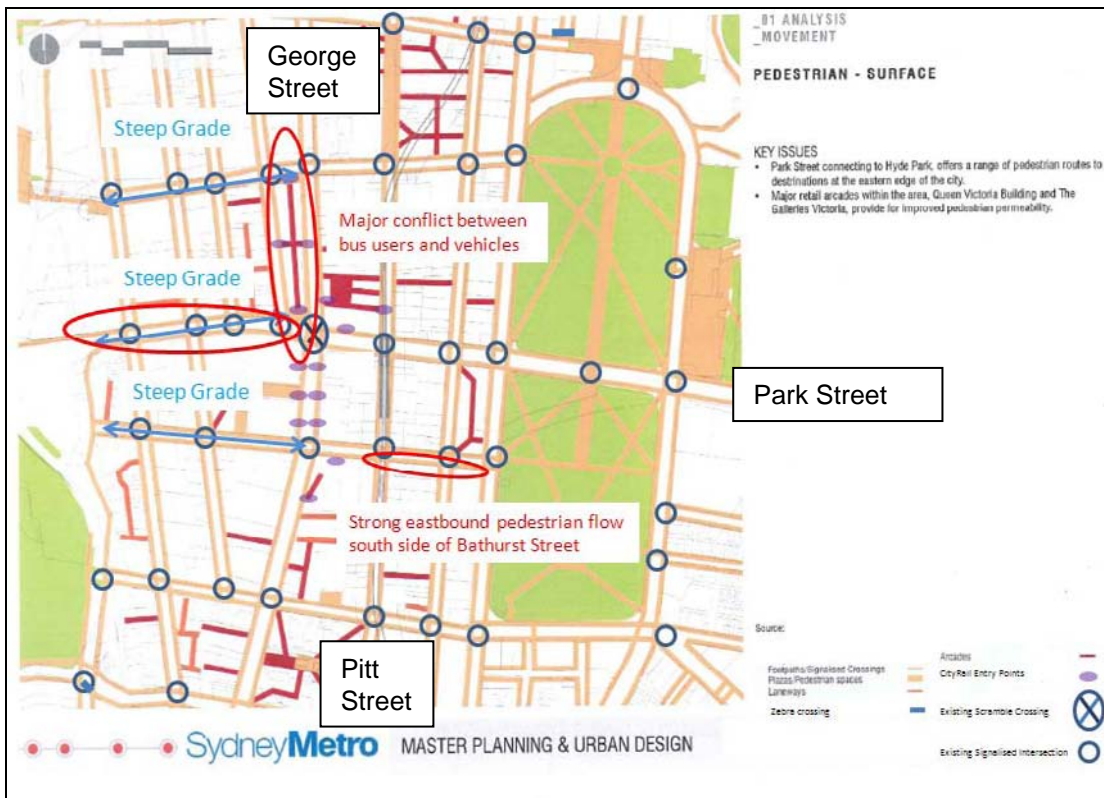
2.1.1 Pedestrian movements and volumes

Surveys were conducted at locations around the Town Hall Station in April 2009 to determine the existing pedestrian flows. Pedestrian volumes are provided **Section 5.3.2** of this TMP.

The pedestrian footpaths in the vicinity of Town Hall Station carry a high number of pedestrians. Particularly strong movements include the east-west movement along Park Street, the north-south movement along Pitt Street (predominantly on the western footpath), and the north-south movement along George Street.

Footpath widths have been identified adjoining the Town Hall Metro Station worksites, as shown in **Appendix A**. The existing footpath network is shown in **Figure 2.1**.

Figure 2.1: Existing Footpath Network



Source: AECOM/SKM/MVA, May 2009

2.1.2 Bus routes and stops

There are a significant number of bus lanes in the vicinity of Town Hall Station worksites to facilitate priority and protection of bus journey times. In particular, there are bus lanes generally north and southbound on George and Elizabeth Streets. Castlereagh Street has a bus lane in the southbound direction. York Street is bus only access (plus local traffic) south of Market Street to Druiitt Street.

In the east and westbound directions, Park Street carries bus priority lanes which operate 24hours per day. The Park Street bus lanes currently serve a number of bus routes, including the Metrobus 10 Route, which is a high frequency route.

It is proposed to create a 'Mid City Interchange' bus terminal in Park Street. This will become the main set down stop for services approaching the CBD from Victoria Road, instead of the existing stop northbound on George Street outside the QVB. This will allow buses to travel east and layover/terminate at the Domain, rather than proceeding north in George Street to the current terminus at Circular Quay, reducing bus congestion on the George Street corridor.

General traffic is prohibited to travel in Park Street between George and Pitt Streets eastbound due to turn bans at the George and Park Street intersection. There is a bus stop in Park Street located between George and Pitt Streets in the eastbound direction.

The mid city interchange proposal is being developed by the Ministry of Transport (MOT).

A plan showing bus lanes in the vicinity of Town Hall Metro Station is shown in **Figure 2.2**.

There is an existing heavy bus movement north and southbound in George Street. There are a number of bus stops occupying the eastern kerb line of George Street between Park and Bathurst Streets.

In Park Street there are bus stops in the east and westbound direction. The westbound bus stop occurs between Castlereagh and Pitt Streets. A bus lane is provided in this direction between Elizabeth Street and Pitt Streets, to assist with maintaining bus reliability and reducing the impact of congestion to buses in this corridor.

Elizabeth Street is also a heavy bus route carrying buses north south through the city with bus lanes generally provided in each direction.

Druitt Street carries a large number of buses inbound and outbound providing access to and from the north west (e.g. via Victoria Road) and also circulating within the CBD (e.g. southbound between Wynyard and Central Station passing through the QVB interchange). Druitt Street carries a bus only section eastbound between York Street and George Street, as well as bus lanes generally in each direction along its length.

A small number of Hillsbus bus services use Bathurst Street with a stop located west of George Street.

The operation of buses in and around Town Hall Metro Station is sensitive due to the magnitude of disruption that can result to a large number of commuter journeys.

The major bus stops are in Park Street, York Street, George Street and Druitt Street.

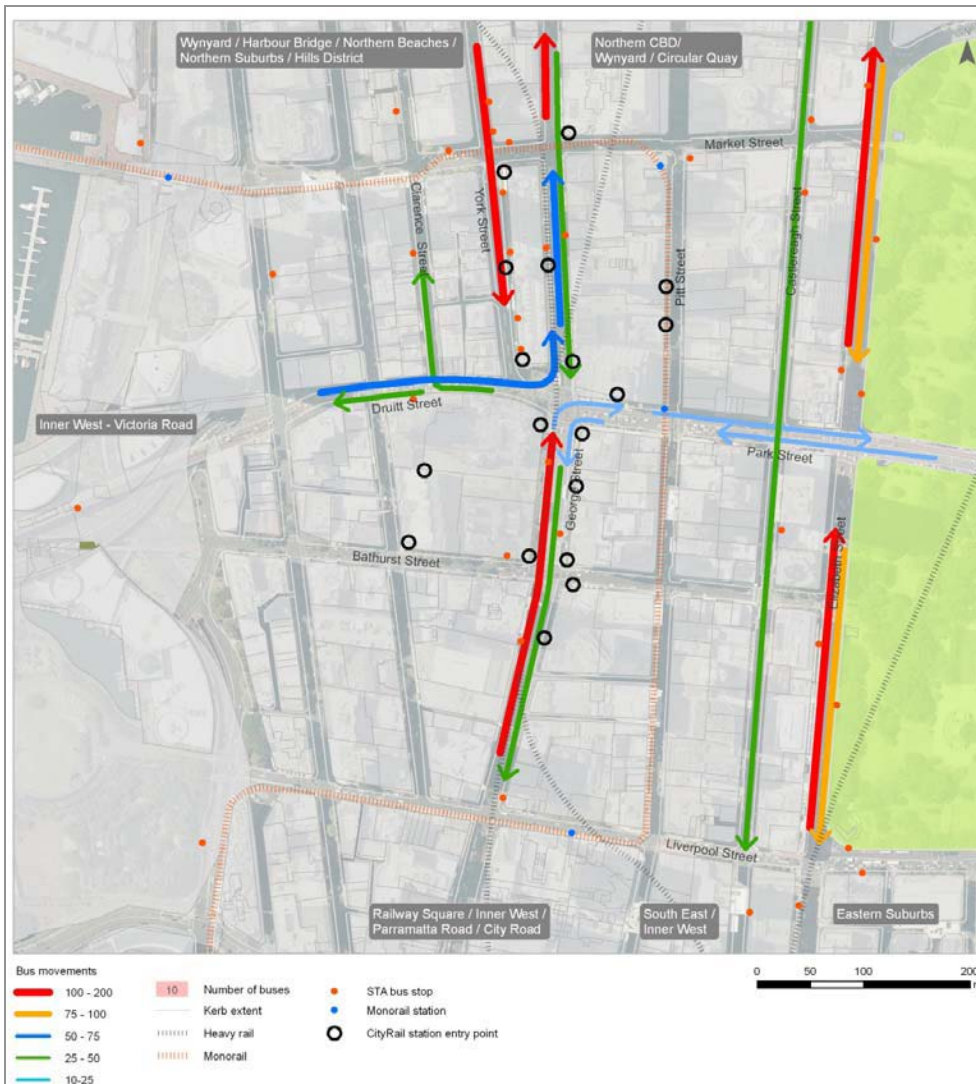
Figure 2.2 shows the locations of STA bus routes and stops in the vicinity of Town Hall and **Figure 2.3** shows a summary of existing bus volumes adjoining Town Hall.

Figure 2.2: Locations of STA bus routes and stops in the vicinity of Town Hall Metro Station, 2009



Source: http://www.131500.com.au/maps/interchangeguides/Town_Hall_MAP.pdf June 2009

Figure 2.3: Bus volumes in the vicinity of Town Hall Metro Station



2.1.3 Taxis

In the vicinity of Town Hall Metro Station there is one formal taxi rank located in Park Street eastbound between Pitt Street and Castlereagh Street, on the northern side of the road. This is a very popular rank and during daytime periods is often fully occupied. Many taxi drivers travel northbound in Pitt Street and turn right into Park Street to access the rank. Sometimes it has been observed that taxis will queue out the rank or extend into the No Stopping zone immediately to the east of the Pitt/Park Street intersections. There is currently space for approximately 8 taxis to use the rank.

There is an additional part time taxi rank located in Bathurst Street, on the northern kerb on the approach to George Street. This rank operates in the daytime up until 3pm.

2.1.4 Cyclists

Cycle lanes exist in William and Park Streets in the east and westbound directions, east of Elizabeth Street. Cycle lanes formally existed in Park Street in the east and westbound directions between George and Elizabeth Streets, having been installed as part of surface road upgrades following completion of the Cross City Tunnel. However these have been removed as part of the creation of Stage 1 of the Mid City Bus interchange in Park Street.

City of Sydney has plans to re-instate a cycle lane facility in Park Street between George and Elizabeth Streets. This cycle lane is proposed to link with the facility which CoS have proposed for Kent Street.

The use of Castlereagh Street as a strategic cycle corridor may also be adopted in the future; however no firm proposal of concept design for the use of Castlereagh Street is currently available.

A plan showing CoS draft concept design for cycle lanes in Park Street is shown in **Figure 2.4** below.

Figure 2.4: Proposed Concept Cycle Lane in Park Street near Town Hall Metro Station

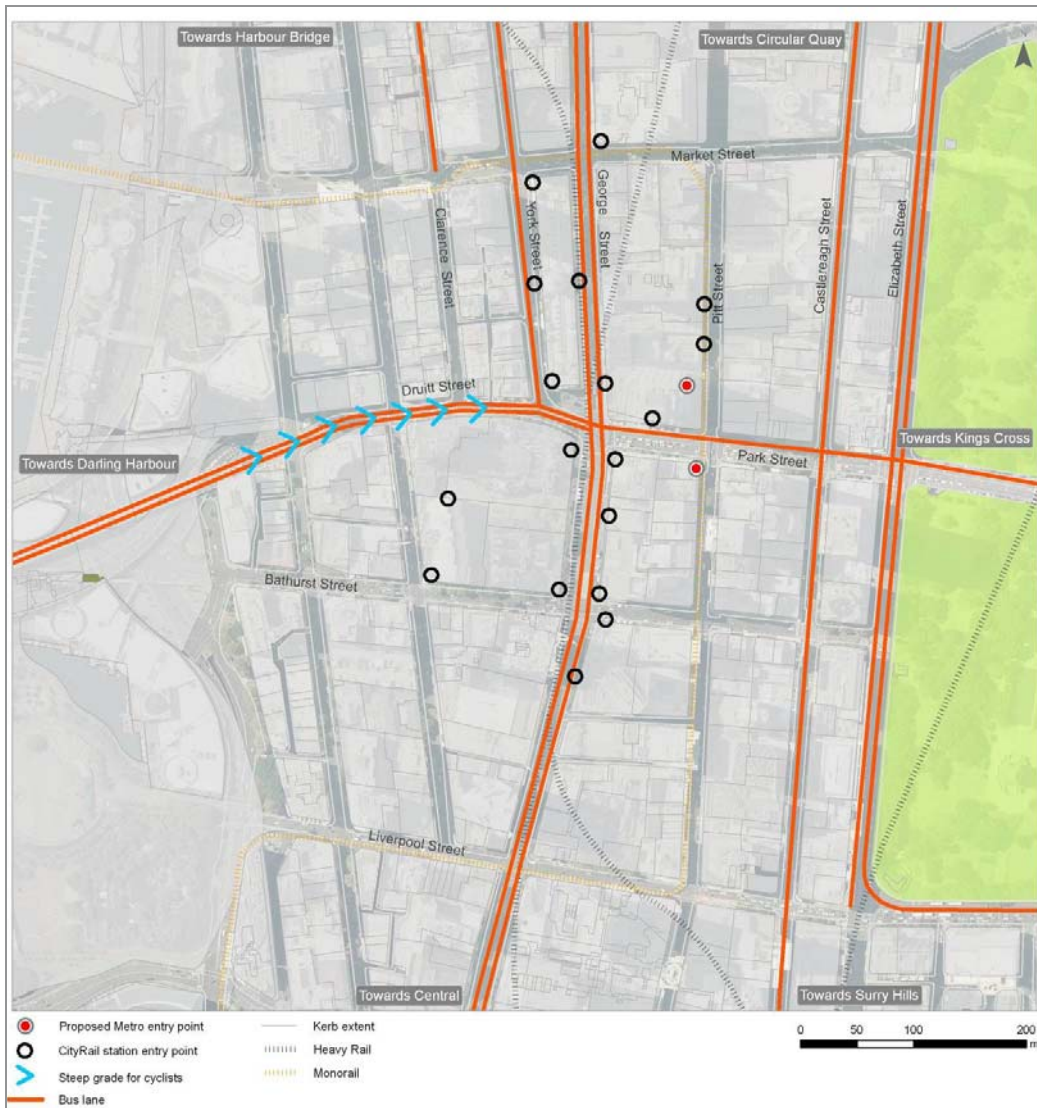


Source: City of Sydney Council March 2009

There are no formal cycle parking facilities in the immediate vicinity of the worksites, however a number of cycle parking hoops are positioned on Smart Poles in Park Street near the site.

Figure 2.5 shows cycle routes and bus lanes in the vicinity of Town Hall Metro Station.

Figure 2.5: Cycle routes and bus lanes in the vicinity of Town Hall Metro Station



2.1.5 Parking

Due to the demand to access and service large buildings in this part of the CBD, kerbside parking or loading restrictions apply on almost all available kerbs in the vicinity of the worksites where the kerbs are not required for traffic capacity or bus lanes. A number of streets and kerbs in the vicinity of Town Hall Metro Station worksites have peak period parking restrictions to facilitate higher traffic flows during the peak periods.

The existing observed parking restrictions in the area surrounding Town Hall Metro Station worksites are shown in **Appendix B**.

In addition to on-street parking, several of the multi storey buildings in the area have basement car parking. Some of these buildings offer casual parking to the public. Of particular relevance are car parks in Pitt Street between Park and Market Streets, including the Hilton Hotel.

Access to basement car parking/loading docks is provided from a number of driveways in Pitt and Bathurst Streets.

Access to the loading dock for the current Woolworths Building is from a driveway entrance in Park Street. It is noted that due to issues such as the difficulty of truck movement turning from/to Park Street, pedestrian issues on the footpath and internal site constraints, the majority of loading for Woolworths is currently undertaken from the southern kerb of Park Street.

The majority of small buildings adjoining the Town Hall Metro Station worksites rely on street frontage for their service and access needs.

2.1.6 Traffic signals

All major intersections in the area are controlled by traffic signals. All signals are assumed to be linked to the RTA SCATS network which allows dynamic response of the traffic signal timings to adjust to changing traffic flows, as well as remote manual adjustment.

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

- Bathurst Street – intersections with George and Elizabeth Streets;
- Park Street – intersections with George and Elizabeth Streets; and
- Pitt Street – intersection with Park and Market Streets.

2.1.7 Other traffic controls

There is a fire priority system in operation at the intersection of Bathurst/Castlereagh and Bathurst/Elizabeth Streets to assist Fire Appliances to exit from the Castlereagh Street Fire Station and travel north and south via Elizabeth Street. The system uses a manual switch from within the fire station once the appliance is ready to leave. This provides a red signal to Castlereagh and Bathurst Street traffic and provides a green signal to clear the block between Castlereagh and Elizabeth Streets, allowing the appliance to travel contra-flow in Castlereagh Street to Bathurst, and then to travel north or south in Elizabeth Street. There may be additional signal settings on other routes away from the Fire Station and at additional signalised intersections.

2.1.8 Existing road network

The existing road network adjacent to the Town Hall Metro worksites is a convergence of major north south and east west routes through the CBD. George and Elizabeth Streets provided one of the major north-south linkages through the CBD and each carry a high number of bus routes, with bus lanes provided along much of the routes to protect bus journey times. In addition to George and Elizabeth Streets, Pitt, Castlereagh and Kent Streets also provide north-south access, however these routes have an increased function for local access to adjoining development compared to George and Elizabeth.

Park and Bathurst Streets are key east-west routes. Below Park and Bathurst Streets, the Cross City Tunnel carries east and westbound traffic between the Western Distributor/Harbour Street and Rushcutters Bay.

The convergence of major north-south and east-west routes near Town Hall provides a challenge for managing traffic flows at major intersections adjacent to the Station. Congestion on Park Street is a common occurrence. Bus lanes provide some protection to bus journey times to ensure congestion results in a minimum of delay to bus travel times.

The existing road network hierarchy is shown in **Figure 2.6** below.

Figure 2.6: Road Hierarchy of Sydney CBD



2.1.9 Traffic volumes and turning movements

Traffic volumes in the CBD are seasonal and change throughout the year, as well as the time the peak period occurs changing as well. December in the CBD is reflective of one of the more busy periods during the year, due to the high number of social and special events as well as Christmas shopping taking place at the many retail outlets in the CBD.

Market Street and Druiitt Street / Park Street are the major westbound arterials, with on ramp connections to the Western Distributor. King Street and Bathurst Street are the major eastbound arterials, with off ramp connections from the Western Distributor. George Street and Elizabeth Street are the major north-south arterials. The Cross City Tunnel provides a motorway connection to the Eastern Distributor bypassing the CBD surface traffic from the Western Distributor near Bathurst Street and from Harbour Street. The intersections of the major arterials at Elizabeth Street / Park Street, George Street / Park Street and George Street / Bathurst Street are heavily trafficked intersections.

Town Hall Square Area - AM peak period traffic volumes

Table 2.1 summarises the traffic volumes at three key locations for the AM peak period.

Table 2.1: AM Peak Traffic Flows – Town Hall Square Area

Time period	George Street (Park Street intersection)	Northbound Pitt Street (Park Street intersection)	Westbound Park Street (between George and Pitt Street)
0700 - 0800	712	437	652
0800 - 0900	900	500	661

Source: Data supplied by RTA, March 2009

Town Hall Square Area - PM peak period traffic volumes

Table 2.2 summarises the traffic volumes at three key locations for the PM peak period.

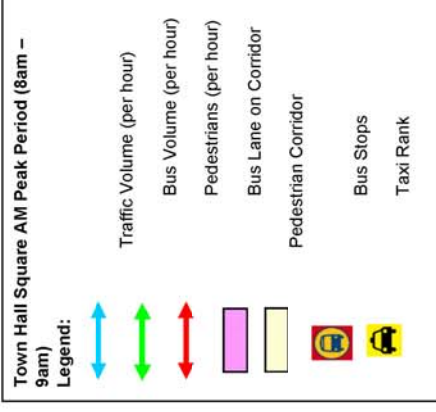
Table 2.2: PM Peak Traffic Flows – Town Hall Square Area

Time period	Northbound George Street (Park Street intersection)	Northbound Pitt Street (Park Street intersection)	Westbound Park Street (between George and Pitt Street)
1700 - 1800	824	550	177
1800 - 1900	895	424	763

Source: Data supplied by RTA, March 2009

Figure 2.7 and **Figure 2.8** summarise the pedestrian, traffic and bus movements for the AM peak period (08:00 – 09:00) and PM peak (17:00 – 18:00). The location of bus stops, bus lanes and taxi ranks are also shown.

Figure 2.7: Existing AM peak movements – Town Hall Square



Source: AECOM

Source: AECOM

2.2 Other

2.2.1 Adjacent developments

There are a number of important land uses adjacent to the Town Hall Metro worksites.

Transport related developments include the Town Hall CityRail Station, the York Street/QVB bus interchange and the Mid City (Park Street) bus interchange.

Other major commercial and retail development includes the City of Sydney Council building and Town Hall, St Andrews Cathedral School, the Queen Victoria Building (QVB), Sydney Water and Energy Australia buildings, Defence Plaza, Galleries Victoria, the Hilton Hotel and others.

3.0 Proposed Work Method

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

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

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

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

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

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

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

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

Table 3.1: Proposed Construction Activities and Indicative Program

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

Source: CBD Metro July 2009

4.0 Worksite Operation and Management

4.1 Worksite locations

There are four worksites proposed to enable construction of the Town Hall Metro Station:

- The primary construction site for the Metro Station cavern excavation and fit out will be located in land located on the southern side of Park Street, between Pitt and George Streets. This worksite will be constructed on land currently occupied by the existing Woolworths and Park Place buildings
- The second worksite will be located in Bathurst Street to the east of Pitt Street, and be constructed in place of two existing buildings located to the east of the Edinburgh Castle Hotel
- The third worksite will be a short term/temporary worksite located in Pitt Street, north of Park Street. This worksite is required to enable sinking a shaft to connect the surface with an underground pedestrian connection
- A fourth worksite (the Pitt-Bathurst worksite) is located on the western side of Pitt Street north of Bathurst Street

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

4.2 Site access and egress

4.2.1 Truck access locations

The following potential truck access and egress points are planned:

Woolworths/Park Place

- Entrance via Bathurst Street exit off the Western Distributor, Bathurst Street, left turn into Pitt Street and left into site. Exit via left turn into Park Street approximately midblock between George and Pitt Streets, straight ahead into Druitt Street, and onto Druitt Street viaduct to Western Distributor.

Bathurst Street

- Entrance via Bathurst Street exit to the Western Distributor, Bathurst Street, and right turn into the site. Exit via a right turn into Bathurst Street, left into Elizabeth Street, right into Park Street, into William Street, left into Bourke Street and then Eastern Distributor. Alternative egress is available via Castlereagh and Liverpool Streets, or Elizabeth/Park/Druitt Streets, however the traffic impact on these routes is anticipated to be greater and if required for ongoing operation will require additional traffic impact assessment.

Pitt Street

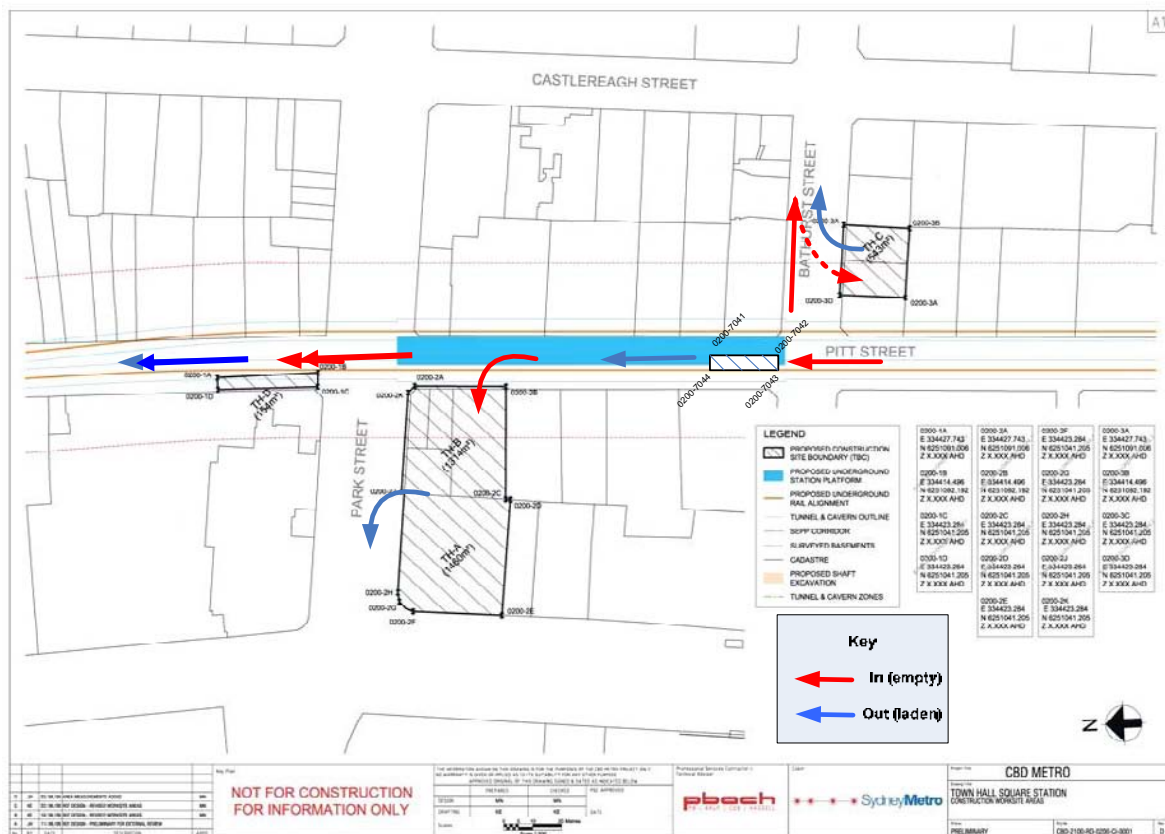
- Entrance via Bathurst Street exit from the Western Distributor, Bathurst Street, left into Pitt Street, across Park Street and into Site. Egress via straight ahead movement in Pitt Street to Market Street and onto Western Distributor. Alternative truck access via temporary off peak road occupancy in Pitt Street, truck to occupy one lane of two, with same truck routes.

Pitt-Bathurst worksite

- Entrance either via left turn from Bathurst Street or North along Pitt Street. Exit back onto Pitt Street then north again along Pitt Street.

Entrances and exits are shown on **Figure 4.1** overlaid onto the construction worksite layout drawings.

Figure 4.1: Proposed construction site truck access points to Town Hall Metro Station



Source: TA2100 and modified by MVA/SKM/AECOM July 2009

4.2.2 Approach and departure routes for trucks

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

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

Network PARAMICS modelling is being undertaken to identify whether the impact of these routes will be acceptable. The results of the analysis will be assessed in consultation with relevant agencies.

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

4.2.2.1 Woolworths / Park Place worksite

Inbound

Route 1 – Western Distributor to Bathurst Street exit, Bathurst Street, left turn into Pitt Street and left into site.

Outbound

Route 1 - Left turn into Park Street approximately midblock between George and Pitt Streets, straight ahead into Druiitt Street, and onto Druiitt Street viaduct to Western Distributor

4.2.2.2 Bathurst St worksite

Inbound

Route 1 – Entrance via Western Distributor Bathurst Street exit, Bathurst Street, and right into site

Outbound

Route 1 – Exit via right turn into Bathurst Street, left into Elizabeth Street, right into Park Street, into William Street, left into Bourke Street and then Eastern Distributor.

Route 2 Option – Exit via right turn into Bathurst Street, right into Castlereagh Street, left into Liverpool Street and east via Cross City Tunnel, north via Western Distributor/SHB, or West via left turn into Harbour, right turn into Pier Street, right into Wattle Street and to Western Distributor.

Route 3 Option – Exit via right turn into Bathurst Street, right into Castlereagh, right into Goulburn, then into Pier Street, right into Wattle Street and to Western Distributor.

Route 4 Option – Exit via right turn into Bathurst Street, left into Elizabeth, left into Park Street, into Druiitt Street and then Western Distributor

It is noted that Route 1 is expected to provide the least traffic impact, with the optional routes outlined above expected to have increased traffic impact and hence if any of these optional routes are required for ongoing operation they will require additional traffic impact assessment.

4.2.2.3 Pitt St worksite

Inbound

Route 1 – Entrance via Western Distributor Bathurst Street exit, Bathurst Street, left turn into Pitt Street, straight ahead at Park Street, and to site

Outbound

Route 1 – Exit site, straight ahead in Pitt Street northbound, left into Market Street, onto Market Street viaduct and to Western Distributor.

4.2.2.4 Pitt-Bathurst worksite

Inbound

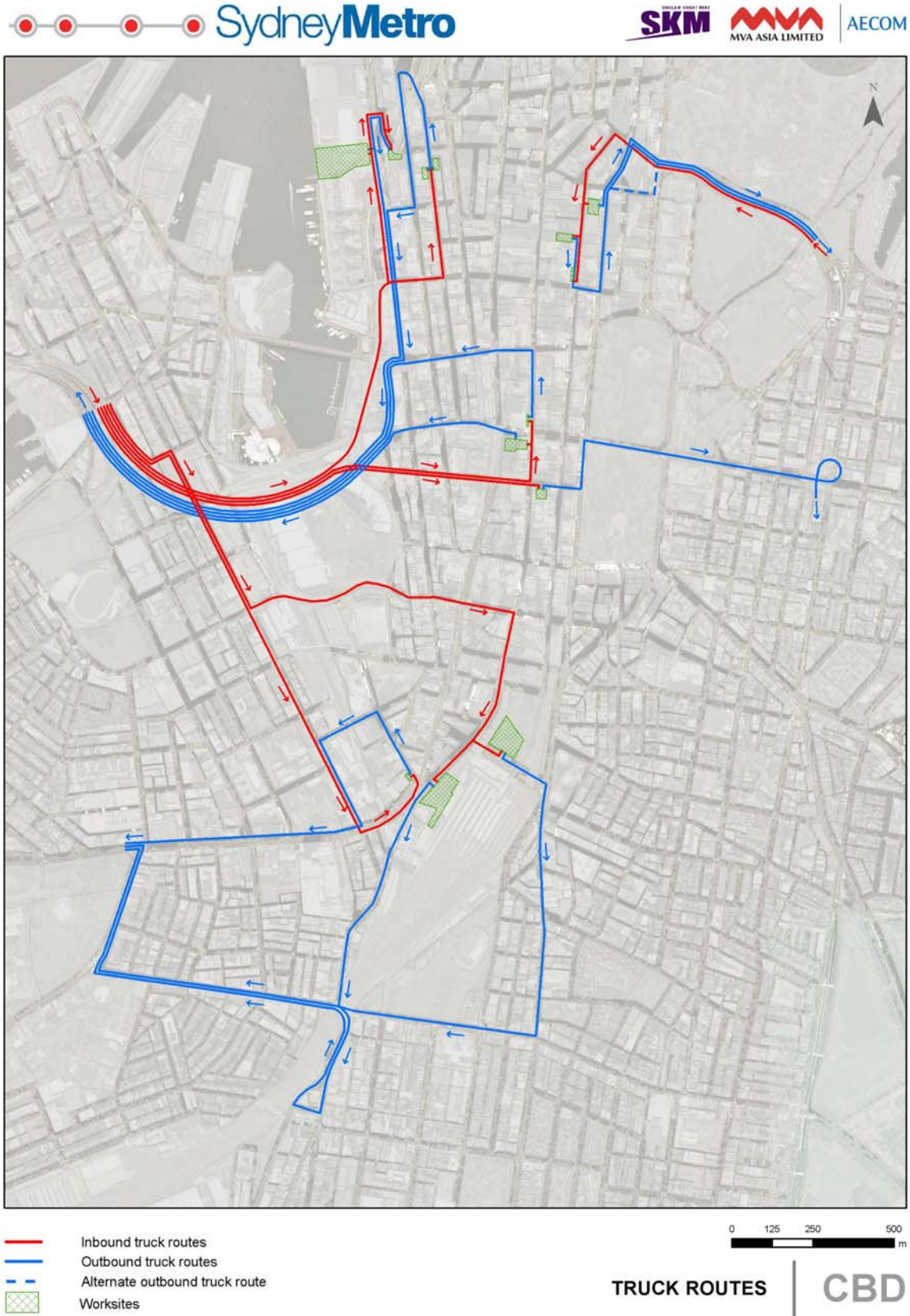
Route 1 – Entrance via Western Distributor Bathurst Street exit, Bathurst Street, left turn into Pitt Street, left into worksite.

Outbound

Route 1 – Left out of worksite into Pitt Street, northbound along Pitt Street, left into Market Street and exit as per Pitt Street worksite.

The primary Route 1 routes are detailed in **Figure 4.2** below:

Figure 4.2: Construction Routes for CBD Metro worksites



4.2.3 Standard spoil truck size

A dual rear axle and single front axle truck of approximately 10.5m has been adopted as the optimum sized vehicle to access these 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 configurations are not ideal for use at the Town Hall worksites for spoil operations, given safety concerns with running these large vehicles on the approach and departure routes through the CBD.

However, larger trucks including articulated vehicles may be used for deliveries to the sites and other non spoil removal activities.

The eventual truck sizes used in construction will be determined by the contractor and specified in the Construction Traffic Management Plans.

4.2.4 Truck manoeuvring requirements

It is assumed that the concertina gates to control pedestrians crossing the site access driveways would operate in parallel with the outside edge of the hoarding. The wider the driveway (and separation of concertina gates), the less lane width is required on Pitt, Park and Bathurst Streets to allow a truck to turn.

In order to assess this requirement, an AUTOTRACK turning path simulation was undertaken for a 10.5m truck.

4.2.5 Access for workers

Access for workers will be via the existing pedestrian footpath network or via a shuttle bus to the site if a shuttle service is offered by the PRI or IMO contractors, most likely from a dedicated parking facility in White Bay.

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

4.2.6 On site parking

The limited worksite areas available at all Town Hall Metro Station worksites will preclude the provision of on-site parking for general work force. However there is potential for parking to be provided on the Barangaroo, White Bay or Rozelle Depot sites with transfers via scheduled bus services or dedicated shuttle bus. The need for this facility is diminished by the good public transport accessibility of the CBD.

There may be the potential for limited on site worker parking, i.e. for the foreman/site engineer/visiting engineer at the Woolworths/Park Place worksite, which may account for one or two vehicles. The physical restrictions of the site boundary limit any further vehicle parking on the site or at the other Town Hall Metro worksites.

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

4.3 Management of site access

4.3.1 Site security

The worksites will be completely hoarded off to provide public safety and site security. The Woolworths/Park worksite will have a noise shed constructed in order to minimise disturbance from construction activity to adjoining sensitive receivers.

Hoardings will be designed to provide a high level of pedestrian amenity and be free of street furniture where pedestrian volumes and footpath narrowing result in disruption to pedestrian flows. Measures will be taken if pedestrians are observed to be straying into traffic or parking lanes to avoid footpath crowding in any narrowed sections.

The Pitt Street worksite will be in use for a much shorter duration than the other two Town Hall Metro Station worksites, and the site fencing used may be of a more temporary nature.

4.3.2 Truck access

The worksite location at both Woolworths/Park Place and Bathurst Street worksites House will require trucks to cross relatively busy CBD footpaths. The management of the driveway access with Traffic Control to reduce potential conflicts between pedestrians and trucks is proposed.

Pedestrian control would take the form of concertina gates manned by traffic controllers to control pedestrian movement on the footpath and deter pedestrians from using the roadway during the period immediately before, during and after a truck is crossing the footpath.

Trucks will enter the worksite and exit in a forward direction at the Woolworths/Park Place worksite. At the Bathurst Street worksite, and at the Woolworths/Park Place if short term construction periods or temporary works are required where trucks are required to reverse into or out of a worksite, they will be accompanied by sufficient traffic control to control both pedestrian and vehicular movements. Traffic control plans detailing any truck reversing movement will require the approval of the relevant authority.

4.4 Management of pedestrians at worksites

Pedestrians will be controlled by Authorised Traffic Controllers and concertina gates used between the hours of 7am-7pm Mon-Fri and at any other period where pedestrian flows are significant, whenever a truck is crossing the footpath. An ongoing operational review will be undertaken to determine if additional times for traffic control of pedestrian movements will be required, i.e. for periods such as Thursday late night shopping, Friday and Saturday night entertainment, or Special Events.

Pedestrians will be segregated from the worksites by hoardings when using footpaths adjacent to the Bathurst Street and Woolworths/Park Place worksites.

Where gantry hoardings are used, lighting will be provided to ensure a safe pedestrian environment.

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

Additional detail relating to footpath widths is provided in **Section 2.1.1** and **Section 5.3** of this Plan.

No significant restriction to the storage space at the signalised pedestrian crossings at Bathurst/Pitt, Park/Pitt or George/Park Streets is proposed, due to the high volume of pedestrian movements on these streets which require space to store while waiting for a green man, prior to crossing the road.

4.5 Hours of work

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

Table 4.1: Expected hours of work

Activity	Construction Hours	Comment/expectations
Below-ground construction activities		
Tunnelling	24 hours per day, six days per week	<ul style="list-style-type: none"> 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	<p>The following activities would be undertaken 24 hours per day, six days per week where noise impact management measures have been established:</p> <ul style="list-style-type: none"> Surface works supporting underground construction (e.g. concrete pumping, truck loading) Excavation in hard ground <p>Non-disruptive preparatory work, repairs or maintenance may be carried out on Saturday afternoons or Sundays between 8am and 5pm.</p> <p>Activities requiring temporary possession of roads may need to be undertaken outside the assumed hours to minimise safety impacts and inconvenience to commuters. Similarly, works involving utilities would need to be undertaken during periods of low demand likely to be outside of standard hours.</p>
Construction Traffic	24hours per day, 7 days per week	<ul style="list-style-type: none"> 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.

4.6 Truck movements associated with spoil excavation

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

Town Hall worksites where demolition is required (Woolworths/Park Place and Bathurst Street worksites) have adjacent parking and loading which is out of the traffic stream (on Bathurst and Pitt Streets) and where off peak loading is available (Park Street). These areas can be utilised for works zones/off peak works zones to enable heavy vehicles to service the worksites during the enabling phases. As such, the demolition / site establishment phases are not anticipated to represent a significantly worse traffic impact than the ongoing spoil removal phase.

For the purpose of trip generation, trucks are assumed to have capacity to carry 5m³ of unbroken rock at all Town Hall Metro Station worksites.

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

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

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

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

Worksite Location	Activity	Excavation (m ³)	Average Production (m ³ per day)	Daily Truck Movements ¹ (two way trips per day)	Average Truck Movements ² (two way trips per hour)	Maximum Truck Movements ³ (two way trips per hour)
Woolworths/ Park Place	Shaft, Mined Tunnels	Soft:10,590	386	156	11	24
		Rock:18,850	204	82	6	
		Rock:2,040	23	10	1	
Main Cavern	Cavern	Rock:38,710	334	134	9	
Bathurst Street	Shaft/ Plant Room	Soft: 1,683	193	78	6	24
		Rock:3,893	34	14	1	
		Rock:1,835	23	10	1	
Pitt Street sites	Shaft/ Mined Tunnel	Soft:2,629	329	132	9	10
Subtotal Rock ⁴			368	148	10	
Subtotal Soft ⁴			943	366	26	
Total:		80,260				

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

Note:

- 1 Number of trucks per day estimated on the basis of 5m³ per single unit dump truck and each movement generating one inbound and one outbound trip
- 2 Average truck trips per hour, based on 15 hours per day
- 3 Maximum truck trips per hour, based on the maximum throughput of one truck per 5 minutes and two trips per truck. Pitt St worksite estimated at 5 trucks per hour.
- 4 Subtotals utilise maximum production rates to give worst case scenario, as different production activities are not concurrent.

4.6.1 Other activities generating truck movements

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

The capacity of the worksite to enable a truck to enter, load/unload provides an upper limit to the number of trucks which can realistically serve the site. This has been estimated in **Table 4.2** as 12 trucks per hour at the Bathurst Street and Woolworths worksites and 5 at the Pitt Street worksite.

4.7 Parking requirements

No on-site parking for general workers or heavy vehicles is proposed other than those trucks actively involved in deliveries or the removal of excavated spoil at the Woolworths/Park Place, Pitt Street or Bathurst Street worksites.

Details relating to potential foreman/engineer parking onsite and the use of Works Zone parking restrictions is covered in **Section 4.2.5** of this Plan.

4.8 Spoil disposal locations and proposed haulage routes

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

Within the CBD, the access routes to and from the two Town Hall Metro Station worksites are outlined in **Section 4.2** of this Plan.

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

4.9 Provision for over-dimension vehicles

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

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

4.10 Other temporary worksites

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

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

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

- Delivery and lifting of large construction equipment, materials, and components of the works (e.g. escalators, lifts, steel or concrete beams/columns, etc) from within the road reserve, that cannot be undertaken from within the main construction sites due to space limitations;
- Removal and lifting of large construction equipment and material (e.g. TBM components at Belmore Park (Central Station), materials from demolition of existing building, etc) that cannot be undertaken from within the main construction sites due to space limitations;

- Pit and duct systems for 11kV construction power supply for all station sites, and 33kV supply at Pymont and Rozelle/Lilyfield;
- Other utility/services connections for construction purposes (e.g. water supply points, connections for telecommunications, etc);
- Construction and permanent depot access connections onto City West Link Road at Lilyfield;
- Pit and duct systems for bulk power supply routes at Central/Surry Hills and Rozelle/Lilyfield;
- Relocation or diversion of existing services/utilities clear of the main CBD Metro construction sites;
- Initial stages of building demolition works where there is no suitable vehicular access within the property boundary;
- Utility/services connections for the CBD Metro infrastructure in the vicinity of stations, and the stabling and maintenance depot (e.g. water supply, sewer, stormwater, power supply, telecommunications, data, etc);
- Other staged temporary areas to facilitate infrastructure construction works;
- Station precinct and stabling and maintenance depot urban domain and finalisation works external to the main worksite locations including minor adjustment/interface with roads; provision of bicycle ways, pedestrian areas and footpaths; hard and soft landscaping; relocation or adjustment to bus stops and taxi ranks; provision of bicycle storage facilities; wayfinding and signage; line marking; exterior lighting; and other urban domain treatment works.

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

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

- Use and management of suitable environmental controls such as cleaning of truck wheels, sweeping or pavements, control of excavated material to prevent mud tracking and dust, silt socks around stormwater inlets, etc;
- Maintaining and coordinating access to adjacent properties, and access for emergency services at all times;
- Undertaking appropriate community notification and liaison prior to and during the works.

4.11 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 traffic impacts of construction are envisaged to relate to:

- Re-allocation of existing kerbside loading/parking restrictions to enable provision of a works zone adjacent to each site;
- Re-allocation of existing kerbside loading/parking restrictions to enable provision of a truck call forward location in Bathurst Street between Kent and George Streets;
- Minor footpath narrowing in the immediate vicinity of the worksites;
- Temporary closure of footpath in Pitt Street, west side, north of Park Street and north of Bathurst Street adjacent to worksites;
- Potential short term full time occupation of a northbound lane in Pitt Street north of Park Street and modification to approach lanes in Pitt Street south of Park Street;
- Minor delays to vehicles in Bathurst and Pitt Street when heavy vehicles are accessing worksites under traffic control;
- Closure of underground pedestrian access to the Woolworths Building from Town Hall CityRail Station;
- Additional truck movements on the surface road network adjoining the site; and
- Minor delays to pedestrian movement on footpaths adjoining the site when trucks are required to cross the footpath.

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

As there are no ongoing road occupancies or lane closures proposed as part of the works which are additional to the current kerbside parking restrictions, there is not expected to be any impact or restriction to emergency services, including fire brigade, vehicles from accessing any buildings.

The exception to this is for the temporary worksite in Pitt Street associated with construction of a shaft and Metro access point. There is the potential for this worksite to require an off peak road occupancy of one lane, leaving one lane open. The short length of lane required and temporary nature of the traffic control is not anticipated to create a significant concern for the access of emergency vehicles. It is noted that this road occupancy is adjacent to the existing Monorail and Galleries Victoria Monorail Station, however no significant impact on Monorail evacuation plans is anticipated. The location of fire hydrants and access requirements has not been established.

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

5.2.3 Size of emergency vehicle

As there are no ongoing lane closures currently envisioned for the Woolworths/Park Place and Bathurst Street worksites, and as such there should not be any impact on the size of vehicle, including emergency vehicle, which can access the adjoining road network at these locations.

The Pitt Street worksite will leave one lane open northbound in Pitt Street. The location of the worksite will not preclude turning vehicle movements from Park Street into Pitt Street, and sufficient lane width will be retained to allow for traffic to travel northbound in Pitt Street.

There should be no restriction on accessibility of emergency vehicles to adjoining buildings.

5.2.4 Events

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

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

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

Increased visitor movements also occur within the CBD on Australia Day, around the Mardi Gras and other scheduled marches / parades that may involve temporary closures on CBD streets and restricted access for private vehicles and altered public transport schedules, and bus layover requirements. Major sporting events on the periphery of the CBD, generate increase pedestrian and public transport activity.

Construction activities involving truck movements and impacts on CBD streets may need to be avoided or minimised during these times. The TTLG will consider the impact of these events and ensure appropriate measures are taken in line with the processes established in the FTMP.

5.3 Pedestrian management

The Woolworths/Park Place and Bathurst Street worksite locations will require trucks to cross relatively busy CBD footpaths. At all times, between 7am-7pm Mon-Fri and other times when pedestrian flows are significant, when trucks are crossing the footpath authorised Traffic Controllers will be onsite to manage pedestrian movement to reduce potential conflicts between pedestrians and trucks. This would take the form of concertina gates to stop pedestrian movement on the footpath. Additional pedestrian management infrastructure to deter pedestrians from using the roadway may be required subject to review of the performance of footpath closure devices at the worksite gateways.

The existing pedestrian subway access to the Woolworths building will be closed at the commencement of construction. Access to all existing George Street portals of the Town Hall City Rail station will be maintained during all permanent stages of work, however short term closure of one or more stairways may be required during the enabling or site establishment works. If required, liaison with CityRail will be undertaken to ensure the impact on pedestrian movement is minimised.

It is proposed that during construction work, some footpath narrowing will result due to the requirement to provide footings for site hoardings. Minimum clear widths to be provided for Town Hall Station worksites are provided in **Section 5.3.2** and **Table 5.3** below. However AS1742.3 states that existing footpaths widths should be retained.

The absolute minimum width for footpath widths is 2.1m clear of any street furniture or obstruction, to provide for two wheel chair users to pass one another. At most locations adjacent to Town Hall Station worksites, the volume of pedestrians demands a greater width of footpath be provided than the minimum.

It is not proposed to reduce the amount of pedestrian storage available at the traffic signals. This is especially important at the intersections of Pitt and Park, and Park and George Streets where due to the high volume of pedestrians on this corridor and length of cycle time, a considerable number of pedestrians accumulate waiting to cross in the peak and lunchtime periods. It is also not proposed to reduce the amount of pedestrian storage in the vicinity of the Town Hall City Rail Station portals in George Street, to facilitate smooth access and egress under all operational conditions of the station, as well as to ensure adequate room for the operation of the bus stops.

5.3.1 Footpath narrowing

Footpath narrowing is anticipated at the following locations:

- Bathurst Street southern footpath, between Edinburgh Castle Hotel and 137 Bathurst Street;
- Pitt Street western footpath between 307 Pitt Street and the intersection of Park Street;
- Pitt Street western footpath north of Park Street for approximately 50m (alternatively this footpath may be closed completely) potentially requiring provision for pedestrians to cross Pitt Street safely at a mid block location or other pedestrian management measures such as utilisation of existing trafficable lane;
- Park Street between Pitt Street and George Street; and
- George Street adjacent to the Woolworths building.

Footpath adjustments required at each worksite is addressed below. **Appendix A** shows the existing observed footpath widths adjoining Town Hall Station worksites. Analysis of the various worksite footpath capacities is provided in **Section 5.3.2**.

5.3.1.1 Woolworths / Park Place worksite

For the Woolworths/Park Place worksite, some narrowing may be required in Pitt, Park and George Streets due to the requirement to provide gantry style hoardings above the footpath and the extent of piling, temporary shoring and excavation activity behind the hoarding. The provision of gantry footings on the outer edge of the footpath will result in a loss of footpath width, estimated to be between 300-500mm.

The existing footpath width on the Pitt Street frontage is approximately 3.6m, widening out at the intersection of Park Street with a kerb extension. The Park Street frontage is approximately 6.4m at the Pitt Street intersection, widening to approximately 7.3m at the George Street end. George Street footpath widths have been estimated in the region of 8.6m, however the CityRail pop-ups reduce the effective width to an estimated 6m.

Preliminary observations of footpath loading suggests that a reduction of footpath width in the order of between 1 and 2m on Park and George Streets for the placement of footings for gantry style hoardings or for temporary shoring/piling/excavation activities will still result in acceptable operation for pedestrians. However, design of the worksites should be such that reductions in clear footpath width are minimised.

The Pitt Street frontage of the site holds much less room for footpath narrowing. Pedestrian flows along Pitt Street are often bunched due to the cycle time at Park Street for pedestrians travelling north-south along Pitt Street. Pitt Street narrowing should be avoided apart from provision for gantry footings on the outer edge of the footpath which will result in an estimated loss of footpath width in the order of 300-500mm.

Storage for pedestrians at the intersection of George and Park, Park and Pitt and Pitt and Bathurst Streets will be maintained at a similar level to the existing.

5.3.1.2 Bathurst Street worksite

Narrowing of the footpath width in Bathurst Street will be required in the vicinity of the worksite due to the requirement to provide gantry style hoardings above the footpath and the extent of piling and excavation activity behind the hoarding. The provision of gantry footings, if these are proposed, on the outer edge of the footpath will result in a loss of footpath width, estimated to be between 300-500mm.

The existing footpath width on the Bathurst Street frontage is estimated at 3.6m, widening out at the intersection of Pitt Street with a kerb extension.

Preliminary observation of footpath loading suggests that the reduction in footpath width resulting from the placement of footings on the kerb side of the footpath, if gantry style hoardings are proposed, will still result in acceptable operation for pedestrians. The potential for further significant reduction in width of the footpath adjacent to the site for temporary shoring or piling activity is limited.

Storage for pedestrians at the intersection of Pitt and Bathurst Streets will remain unchanged.

5.3.1.3 Pitt Street worksite

Pedestrian flows along Pitt Street are often bunched due to the long cycle time at Park Street for pedestrians travelling north south along Pitt Street. The presence of the Monorail station piers to the north of the proposed worksite result in an effective width of footpath in the order of 2-2.5m. Given the relatively high flow of pedestrians, a minimum footpath width in the range of 2.5-3.0m should be maintained between the worksite and the building alignment.

There is the possibility that the worksite boundaries of the Pitt Street worksite will require the complete closure of the footpath in Pitt Street. Detailed worksite layouts are not yet available to ascertain this requirement.

If the complete width of footpath is required to be occupied by construction activity, the alternatives are as follows:

- Close the footpath and force pedestrians to cross to the eastern side of the road to travel north-south in Pitt Street. The closure of the footpath in the southern direction will present a challenge to this option, due to the requirement to allow for southbound pedestrians to cross to the eastern side of the road. There are currently no mid-block pedestrian crossing facilities, however it is noted that due to the relatively low volume of traffic in Pitt Street, the platooning of vehicles which results from the Park Street traffic signals and the effective road width in Pitt Street (2 traffic lanes) that many pedestrians currently cross Pitt Street mid block. The use of traffic controllers to assist pedestrians to cross or installation of a marked foot crossing may be potential solutions.
- Close the western northbound lane in Pitt Street and provide for the footpath in this lane. This arrangement would require adjustment to the approach lanes on Pitt Street south of Park Street. Given the current volume of traffic which travels northbound in Pitt Street (approximately 470 in the AM peak and 220 in the PM peak) this could potentially accommodate in one lane. The primary congestion experienced in Pitt Street originates from the Market Street traffic signals, where through traffic and traffic exiting the Pitt Street carparks (Hilton etc) combine. It is noted that closure of one lane may be required for truck access to the worksite, and in this case pedestrian and truck operational needs would need to be balanced to ensure pedestrian access remains viable.

5.3.1.4 Pitt-Bathurst worksite

It is anticipated that the worksite will require closure of the western footpath along Pitt Street in the vicinity of the worksite. Pedestrians would either be re-routed via the Pitt Street carriageway or be re-routed to the

eastern side of Pitt Street. Diversion to the eastern footpath would have less adverse traffic impacts and would be safer.

5.3.2 Pedestrian capacity

Detailed analysis or modelling of pedestrian capacity due to closed footpaths or restricted width is not currently anticipated to be required due to the observed volume of existing pedestrians, the limited footpath width required for provision of construction infrastructure and having regard to the overall width of footpath available at the sites. However, more detailed analysis or modelling may be undertaken at the CTMP stage if deemed to be required or the assumptions in **Section 5.4** are modified as construction methodology becomes further detailed.

Pedestrian capacity has been estimated based on Highway Capacity Manual 2000 (HCM) methodology for walkways of total width between face of building and hoarding of 3.0m, 4.0m or 5.0m.

The following assumptions were adopted:

- i. Effective walkway width = Total width less shy line effect for walls (Ref: HCM 0.5m for wall without window display). This would yield effective widths of 2.0m, 3.0m and 4.0m. Note this assumes a clear width without obstructions, such as footings, support posts etc.
- ii. 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 adjacent to sites. The resultant capacities for effective walkway widths of 2.0m to 4.0m is shown in **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 etc.
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	4.0m
C (incl platooning)	1,200-2,400	1,800-3,600	2,400-4,800
D (incl platooning)	3,120-4,320	4,680-6,480	6,240-8,640

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 500mm to vertical obstruction such as walls/ hoarding.

An assessment of the proposed minimum footpath widths is made in **Table 5.2**. The table allows for reduction of effective width of 2 x 500mm, to account for the presence of hoardings on both sides of the footpath (i.e. footings for gantry supports or other street furniture on outer edge, and hoarding on inner edge). Improvements to footpath capacity could be obtained by minimising the street furniture and providing gantry supports only at isolated sections rather than continuously.

It is noted that many factors may influence footpath capacity and the suitability of the surveyed pedestrian counts for direct comparison to mid-block capacities is unclear. The information contained in **Table 5.3** should only be used as a guide as to the likely capacities, and subject to more detailed assessment prior to implementation of any footpath narrowing.

Table 5.3: Proposed Minimum Footpath Width capacities:

Worksite	Street	Survey Flows (two way)	Existing Width	Possible Proposed Width	Approximate Proposed Capacity at LoS C
Woolworths/Park Place	Pitt Street west, south of Park	1,300	3.6m	3.1m	1,200-2,400
	George St east	2,400	6m (estimated)	4m	1,800-3,600
	Park St south	1,800	6.4m	4.5m	2,100-4,200
Bathurst Street	Bathurst Street south	1,350	3.6m	3.1m	1,200-2,400
Pitt Street (north of park street)	Pitt Street west, north of Park St	1,300 (estimated)	3.6m	2.5m (min)	900-1,800

* Excludes Pitt-Bathurst site which would require closure of western footpath

Based on the indicative capacity analysis in **Table 5.3**, all footpaths appear to operate satisfactorily at the nominated narrowing of width.

For the purposes of the analysis, the full closure of Pitt Street footpath on the western side has not been assumed. This option may be required for a temporary period once detailed worksite layouts are developed.

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

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

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

If required for any temporary staged cut and cover works related to construction of the Town Hall Station, temporary ramps will be provided to facilitate mobility impaired pedestrians to traverse kerbs where permanent kerb laybacks are not provided.

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

5.3.4 Site access management

Truck access to the Bathurst Street worksite is limited due to the small space available onsite. The site is not large enough to allow vehicles to turn around within the site and hence be able to enter and exit in a forward direction. As a result, either the entrance or exit manoeuvre will have to be undertaken in reverse. To facilitate this, traffic control will be required to manage traffic in Bathurst Street, as well as pedestrians on the southern footpath, for every truck which is required to enter the site. The same site constraints and traffic control need applies to the Pitt Street worksite.

Given the proposed works zone to be created in the existing kerbside lane adjacent to the worksites, trucks will be turning from the second lane at the Bathurst Street and Woolworths/Park Place worksites. Appropriate design of the driveway splay will be made to ensure vehicles can safely undertake this turn to or from the second lane. The alternative movement (to or from the site) will require the truck to be in reverse, which will occupy all travelling lanes of Bathurst Street for the period required to facilitate the turn under traffic control.

Vehicular access to the Park Place worksite from Pitt Street will be made in a forwards direction. Given the proposed works zone to be created in the existing kerbside lane adjacent to the worksite, trucks will be turning from the second lane. Appropriate design of the driveway splay will be made to ensure vehicles can safely undertake this turn to or from the second lane.

The egress movement from the Woolworths/Park Place worksite will be made into Park Street. The footpath on Park Street is wide and appropriate design of the driveway splay will be made to allow vehicles to turn into the second lane, to assist them to travel westbound into Druiitt Street. Vehicles will be able to turn out without traffic control by merging with slow moving traffic.

Pedestrians will be managed with gates and traffic control whenever a vehicle is crossing a footpath at both Town Hall worksites between the hours specified elsewhere in this TMP.

5.4 Assumptions, exclusions and limitations

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

- Sight lines to traffic signal lanterns must be maintained
- Absolute minimum footpath width required for hoarding footings (300mm);
- Footpaths will be cleared of other street furniture adjacent to hoardings;
- No intrusion of worksite boundaries into the footpath; and
- Enabling or site setup works have not been considered (will need to be considered at CTMP stage).

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

5.5 Servicing

Woolworths / Park Place site

There are several adjoining buildings which need to be considered to ensure suitable servicing and access arrangements are maintained when constructing the Woolworths / Park Place worksite. In Pitt Street, there are driveway entrances to four buildings with driveway access points to consider:

- Number 270 – Federal Government Building. There are no impacts perceived to the access or service arrangements to this building;
- Number 309 Pitt Street. There are no impacts perceived to the access or service arrangements to this building;

- Number 321 Pitt Street. There are no impacts perceived to the access or service arrangements to this building; and
- Number 307 Pitt Street. This site is located immediately adjacent to the proposed worksite, and consists of a narrow driveway accessing what is assumed to be a small underground carpark and loading dock. There is no direct impact to the access or servicing arrangements of this driveway, however there may be some additional friction for vehicles entering or exiting due to traffic entering and exiting the Park Place worksite.

Additional buildings whose servicing is also adjoining the worksite is the Criterion Hotel at the south east corner of Pitt and Park Streets. Keg delivery to the Hotel currently occurs within the section of No Stopping restriction on the eastern side of Pitt Street on approach to the traffic signals. There is no impact envisioned to the servicing of the Hotel.

Adjoining buildings in Pitt and Park Street who rely on on-street servicing/loading activity will be impacted by the loss of an anticipated 4 on street loading bays in Pitt Street, south of Park Street.

The CBD Monorail also runs adjacent to the site. The height to the underside of the Monorail is 5.4m, which will not impact on heavy vehicle operation driving underneath the track. The hoarding and any scaffolding associated with demolition of the existing building will be designed to ensure debris associated with demolition (or construction) cannot fall into or intrude into the operational envelope of the Monorail. There may be a requirement through the construction process to crane lift items over or through the Monorail operational envelope. If this is the case, liaison will take place with the Monorail operator to determine any special requirements. No impact to the operation of the Monorail is expected.

The Federal Government building at 270 Pitt Street is a sensitive neighbour due to the nature of staff employed within the building. No impact to the servicing or access arrangements to this building have been identified, however liaison with tenants of the building may be required to determine if they have any special needs which should be considered through the construction process.

Bathurst Street site

There are existing driveway access points to the Sydney Water and Energy Australia buildings located in Bathurst Street, between George and Pitt Streets. There is proposed to be no impact to these facilities.

There is an existing loading dock and entrance to underground carpark as well as access to the rear of the Castlereagh Street Fire Station located in Bathurst Street between Pitt and Castlereagh Streets. Observation indicates that this entrance is used by fire appliances returning to the Station as well as other vehicles accessing the underground car parks. The proposed worksite will be located immediately west of this entrance.

There is not anticipated to be any significant impact to this driveway entrance from the proposed worksite. The hoardings and works zone associated with the worksite will extend to the eastern edge of the property/worksite boundary. There is not anticipated to be any change required to turning paths or clearance for vehicles turning into the driveway, due to the presence of an existing hoarding and street furniture (parking sign).

The Edinburgh Castle Hotel is located immediately west of the proposed worksite. Examination of the pub servicing indicates that deliveries to the pub take place from the Pitt Street kerb. There is no proposal to modify the existing servicing or access arrangements to the Hotel.

The remaining access and servicing for businesses on the adjoining sections of Bathurst Street is undertaken from the street. There will be a limited impact on loading and servicing from Bathurst Street due to the requirement to remove approximately 6 loading/parking spaces at the front of the worksite to create a works zone.

Pitt Street sites

Properties adjoining the Pitt Street worksite are served by a combination of on street, rear lane and basement loading. In particular, properties on the eastern side of Pitt Street rely on street loading provided in Pitt Street. The temporary removal of 4 on street loading spaces is likely to impact on the availability of loading spaces within Pitt Street, however alternative loading spaces on street is available to the north and south in Pitt Street.

Should the full closure of the footpath on the western side of Pitt Street for approximately 30-50m north of Park Street, this will impact on access to several shops that front Pitt Street. Alternative access arrangements to these premises or compensation for a loss of trade if no access can be provided may be required if this footpath is closed.

Pedestrian access to properties at the Pitt-Bathurst worksite in Pitt Street will be maintained during construction.

5.5.1 Provision for adjacent development

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

- Considerate design of hoardings, access points and scaffolding on the Pitt Street frontage of worksites to ensure no impact to the operations of the Monorail;
- Liaison with the Monorail operator should any crane lifting be required within or over the Monorail operational envelope;
- Liaison with 207 Pitt Street to determine if any special requirements are required due to the sensitive nature of the building tenants;
- Considerate design of hoardings and worksite boundary to ensure acceptable access is maintained to driveway access point of 307 Pitt Street; and
- Considerate design of hoardings and worksite boundary to ensure acceptable access is maintained to driveway access point of 137 Bathurst Street.

5.5.2 Cash in transit

It is important for cash in transit vehicles to be able to retain a high degree of accessibility to pick up points to manage the risk of moving cash.

Given the limited impact on lane and parking arrangements resulting from the construction of the Town Hall 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 routes and access

There is no specific provision for cyclists on the roads surrounding the worksite.

It is acknowledged that City of Sydney have a proposal to install cycle lanes on Park Street to replace the ones which were removed as part of the Mid City bus interchange works. This cycle enhancement facility is being considered for inclusion as part of the end state for CBD Metro.

Construction activity or traffic generation is not anticipated to preclude the early delivery of CoS cycle lanes in Park Street, however no specific provision for this early delivery is being made as part of this TMP.

Cycle parking occurs in Park Street on the southern side footpath adjacent to the proposed worksite, on an informal basis and also on several cycle hoops mounted on Smart Poles in Park and Pitt Streets. Much of the demand for cycle parking on the southern side of Park Street is assumed to be associated with the existing land uses. Demolition of these buildings will reduce the demand for cycle parking in this length of Park Street.

As such, and given the competing demands for footpath space in the vicinity of the worksites due to provision of hoardings and worksite boundaries, it is not proposed to provide any formal cycle parking in the vicinity of the Town Hall Station Worksites during the construction phase. Existing cycle hoops would be removed where required to ensure sufficient footpath capacity is maintained adjacent to hoardings or site fences.

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

5.7 Bus routes and stops

The construction traffic management results in no change to existing public transport bus provisions.

There is the potential minor impact to travel time for westbound bus operation in Park Street due to friction created by trucks merging into the westbound traffic stream from the worksite, plus the small additional volume of vehicles using Park Street. These impacts are expected to be very minor, and will be quantified through PARAMICS network modelling.

The truck call forward location may use a section of kerb space in Bathurst Street, between Kent and George Streets. On the northern side of Bathurst Street the kerb is utilised at the western end by Hills bus services. As the truck call forward location is expected to utilise kerb space to the east of the bus stop, this is not anticipated to compromise bus operations and if this section of kerb is required to be reinstated to bus use for any reason, construction traffic arrangements can be reviewed at that time.

There is not anticipated to be any impact to bus stops in Park Street east or westbound, or in George Street. If a gantry style hoarding is used on the George Street frontage of the Woolworths/Park Place worksite, lighting and urban treatments will be used to minimise the impact on pedestrian/bus passenger amenity.

5.8 Coaches

There is very little coach activity in the area, although some coaches use Market Street. There is not anticipated to be any impact on coach activities, and as such, no specific traffic management or pedestrian strategies are proposed.

5.9 Taxis

As there is no change proposed to the taxi ranks in Park Street during the construction phase of the project, the impacts to Taxi operation will be minimal.

The proposed truck call forward location may use a section of kerb space in Bathurst Street, between Kent and George Streets. On the northern side of the road this section of kerb is a part time Taxi rank, operating between 8am and 3pm. There is the potential that this rank may be affected by the installation of the truck call forward area, and if so, an alternative nearby location for the rank may be

required. Alternative locations include sections of parking/loading elsewhere on Bathurst Street between Kent and George Streets.

The residual operational impacts will relate to a minor increase in travel time and friction in Park Street westbound, and in Pitt Street northbound. The westbound movement in Park Street offers protection to taxi travel times through utilisation of the bus lane, resulting in minimal overall impact to taxi operations.

The design of Traffic Control Plans to affect a temporary lane occupancy (if required) in Pitt Street north of Park Street will be such that impact to Taxis travelling north in Pitt Street or east in Park Street and accessing the rank in Park Street eastbound is not impacted.

Changes in overall network travel times for taxis are anticipated to be the same as for general traffic.

Liaison with City of Sydney and the Taxi Council through the TTLG will be undertaken should adverse impacts on taxi operation become evident or require action through the construction process.

5.10 Kiss and Ride

There are no formal Kiss and Ride facilities which are in the vicinity, or impacted on by, the Town Hall worksite areas. However, informal facilities may exist particularly in the vicinity of Town Hall City Rail Station.

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

5.11 Parking

The diagrams provided in **Appendix B** indicate the existing provision of parking in the vicinity of Town Hall Station Construction sites:

The following changes to parking restrictions have been identified:

- Conversion of existing parking or loading in Bathurst Street between Kent and George Street to provide a 'works zone' to act as a possible call forward location for trucks. The number of vehicle spaces that are required for the works zone will be the subject of detailed investigation by the PRI contractor. However, it is assumed that a minimum of two (2) and potentially removal of all existing parking/loading on either the northern side or on the southern side of Bathurst Street may result;
- Removal of existing Loading/parking in Pitt Street northbound on the western kerb on approach to Park Street, to provide a works zone and driveway entrance to the worksite. Approximately four (4) spaces would be removed;
- Removal of existing loading/disabled parking/parking on the western side of Pitt Street, north of Park Street to provide a works zone. Approximately four (4) spaces would be removed;
- Removal of existing off peak loading on Park Street to provide a works zone between Pitt and George Streets. The existing Mail Zone would be retained;
- Removal of existing loading/parking spaces in Bathurst Street, east of Pitt Street, to provide a works zone at the frontage of the worksite to Bathurst Street. Approximately six (6) spaces would be removed; and
- Removal of 2 '5 minute' car spaces in Pitt Street north of Bathurst Street.

Given the competition for kerb space around the work sites and existing traffic flows, it is not possible to provide replacement parking or loading zones that are required for construction activities. This will result in an increase in competition for the remaining spaces.

The two proposed adjustments to Bathurst Street to remove loading spaces offer the opportunity to redistribute the current kerbside restrictions to ensure the loss of loading facility could be balanced by also adjusting other adjoining restrictions – e.g. timed parking.

Due to the increased competition for loading space and the dynamic response that the majority of on street loading can make to changes in the available kerb space, a further detailed examination of provision of loading in the adjoining areas will be made during the CTMP process, when exact works zone requirements are known. This may recommend the reduction in the duration of loading provided to increase turn-over of spaces, or the conversion of timed parking in Pitt, Bathurst or Castlereagh Streets to loading spaces.

5.12 Traffic

5.12.1 Vehicle speeds

The existing speed limit on all streets in the vicinity of worksites is 50km/hr. During weekday daytime and peak periods, vehicle speeds are often much lower due to traffic congestion.

It is not anticipated that permanent reductions in speed limit will be required to facilitate Town Hall Metro Station construction.

Short term road occupancies may also require a temporary reduction in speed limits while workers are onsite, and if required, all changes to speed limit will be undertaken in accordance with the process outlined in the FTMP.

5.12.2 Road network changes

The construction activities will all take place behind hoardings for the majority of the work. Some enabling activities may require the use of road space on a temporary basis in order to undertake excavations or adjustments to utilities in footpaths and roads adjoining the worksites.

The Pitt Street worksite north of Park Street is likely to require an ongoing road occupancy in order to facilitate setup of the worksite and effective pedestrian management. This may require modification of the approach lanes in Pitt Street northbound to change the existing left and through shared lane to a dedicated left turn lane with the centre lane becoming the only through lane.

No other ongoing road changes are proposed related to the construction of Town Hall Metro Station.

5.12.3 Intersection operation

PARAMICS modelling of the CBD is being undertaken by Halcrow MWT utilising their CBD network model. The modelling is being overseen by the RTA and has been based on no major changes to intersections adjoining Town Hall Metro Station worksites, with the exception of the potential reconfiguration of Pitt and Park Streets to balance the northbound departure through lanes with the approach side. This may require conversion of the shared left and through into a dedicated left turn lane, with one remaining through lane retained and no change to the right turn lane.

5.12.4 Impact of construction traffic on frontage roads

The forecast truck movements relative to the existing flows on frontage roads are presented in **Table 5.4**.

Table 5.4: Summary of increased Traffic on Frontage Roads due to Construction of Town Hall Metro Station

Site/ Frontage Road	Existing		Truck movements		Increase (%)	
	AM Peak Hour	PM Peak Hour	Average Hourly Flow	Maximum Hourly Flow	AM Peak hour/Max truck flow	PM Peak hour/Max truck flow
Bathurst Street (e/b at Pitt)	1467	1320	13	29	1.98%	2.20%
Park Street (w/b west of Pitt)	661	763	6	12	1.82%	1.57%
Pitt Street (n/b south of Park)	497	545	5	17	3.42%	3.12%
Druitt Street (w/b east of Clarence)	1046	1212	6	12	1.15%	0.99%
Bathurst St (e/b west of Castlereagh)	1402	1315	3	12	0.86%	0.91%
Elizabeth Street (n/b north of Bathurst)	1514	1262	3	12	0.79%	0.95%
Pitt St (n/b north of Park)	468	220	5	5	1.07%	2.27%

Source: TA2108

Note: Assumes an estimated 5 truck movements per hour serving Pitt Street North worksite.

Increase calculated from the higher of the maximum hourly truck flow or average truck flow.

Modelled scenario did not include Pitt-bathurst worksite

It can be seen from the above Table that the increase to traffic volumes due to construction traffic is relatively minor, averaging approximately 1.7% for all frontage roads based on the maximum hourly flow. The increase to traffic based on the average hourly truck flows is approximately 0.8%. This calculation is conservative, as it assumes all worksites are operating at full production capacity, and all worksites are operating concurrently. Further, it assumes that the hours of daily operation are 15 hours of trucking operation.

5.13 Project impacts and sensitivities

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

Any factor which causes an unplanned delay to the rate of spoil removal will have effects on the quantity stored on site and ultimately on the rate of progress of the work. There is limited opportunity to increase the rate of truck arrivals at the site to clear a backlog, due to the time required to enter, load and depart, which is estimated at some 5mins or a maximum of 12 trucks per hour. This is particularly relevant to the Bathurst Street worksite given the small worksite. For this reason, contingency planning for night-time spoil removal is being considered, however the feasibility of this option in terms of the potential noise impacts has not been confirmed and is the subject of an additional study. There are a number of sensitive receivers in the form of residential and temporary (e.g. Hotel/ Serviced Apartments) accommodation in the vicinity of the Town Hall worksites. The construction impacts arising from non-traffic related sources such as noise and vibration are addressed elsewhere.

5.13.1 Other adjoining redevelopment

A review of CoS Commercial Development Monitor (Issue 18 December 2008) was undertaken to determine the extent of proposed redevelopment in the area adjoining Town Hall Metro Station worksites and proposed Town Hall Station truck haul routes, to allow the impact of adjoining redevelopment to be considered. The evaluation made assumptions regarding the likely truck routes used by the various redevelopment sites as this information is not available from the Monitor Report.

The following development sites have been identified as potentially concurrent:

- 219-227 Elizabeth Street Sydney (commenced);
- 232-236 Pitt Street Sydney (Approved, not commenced); and
- 201 Castlereagh Street Sydney (lodged, not approved or commenced).

The Elizabeth Street worksite is located at the corner of Castlereagh, Bathurst and Elizabeth Street, with construction access generally via Castlereagh Street. There should be minimal overlap or cumulative impact between this and Metro construction sites and no strategy is proposed to mitigate this.

The 232 Pitt Street worksite is located in Pitt Street, between Park and Market Streets. This site is likely to have an overlap of construction vehicle impact in Pitt and Bathurst Streets. At this point in time, no further details regarding the scope of proposed approved work are known. There is the potential for truck access routes to the Metro and 232 Pitt Street worksites to both use Bathurst, Pitt and Market Streets.

There is the potential that the Pitt Street worksite may be in operation at the same time as the redevelopment of 232 Pitt Street, which would increase the competition for works zones in Pitt Street.

It is proposed that the cumulative impacts of the concurrent construction activity will be considered through the TTLG process once details of the likely trucking routes and other construction activities become known.

The Castlereagh Street development proposal is located in Castlereagh Street between Park and Bathurst Streets. There should be minimal overlap or cumulative impact between this and Metro construction sites and no strategy is proposed to mitigate this.

The TTLG will be able to co-ordinate and respond to changing construction activity in adjacent worksites, as detailed in the FTMP.

5.13.2 Network modelling

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

5.13.3 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 network adjustments required and traffic impacts

The following represent the major network adjustments and traffic impacts that will result due to the CBD Metro Town Hall Station construction sites:

- Driveway access points into worksites;
- Use of traffic controllers to facilitate entry/exit to the Bathurst Street and Pitt Street worksites resulting in minor delays to traffic in Bathurst and Pitt Streets;
- Temporary road occupancy in Pitt Street north of Park Street (outside of peak periods) or alternatively a full time road occupancy with one single northbound lane retained with conversion of northbound left and through shared lane to a left only lane;
- Temporary road occupancy in Pitt Street north of Bathurst Street (west side at Pitt-Bathurst worksite) and possible diversion of pedestrians via western carriageway or eastern footpath;
- Pedestrian control concertina gates to facilitate trucks crossing footpaths resulting in minor delays to pedestrians whilst trucks are accessing worksites;
- Changes to parking, loading and other kerbside uses adjoining the worksites and on approach roads for the duration of work;
- Increase of up to a maximum of 2% and average of 0.8%, in traffic volumes adjacent to the worksites due to construction traffic ;
- Potential short term closure of the western footpath in Pitt Street, for approximately 50m north of Park Street; and
- Localised reduction in footpath widths in the vicinity of worksites.

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 the Environmental Assessment for the project.

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

6.1 Compliance with Director General Requirements

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

Table 6.1: Director General's Environmental Assessment

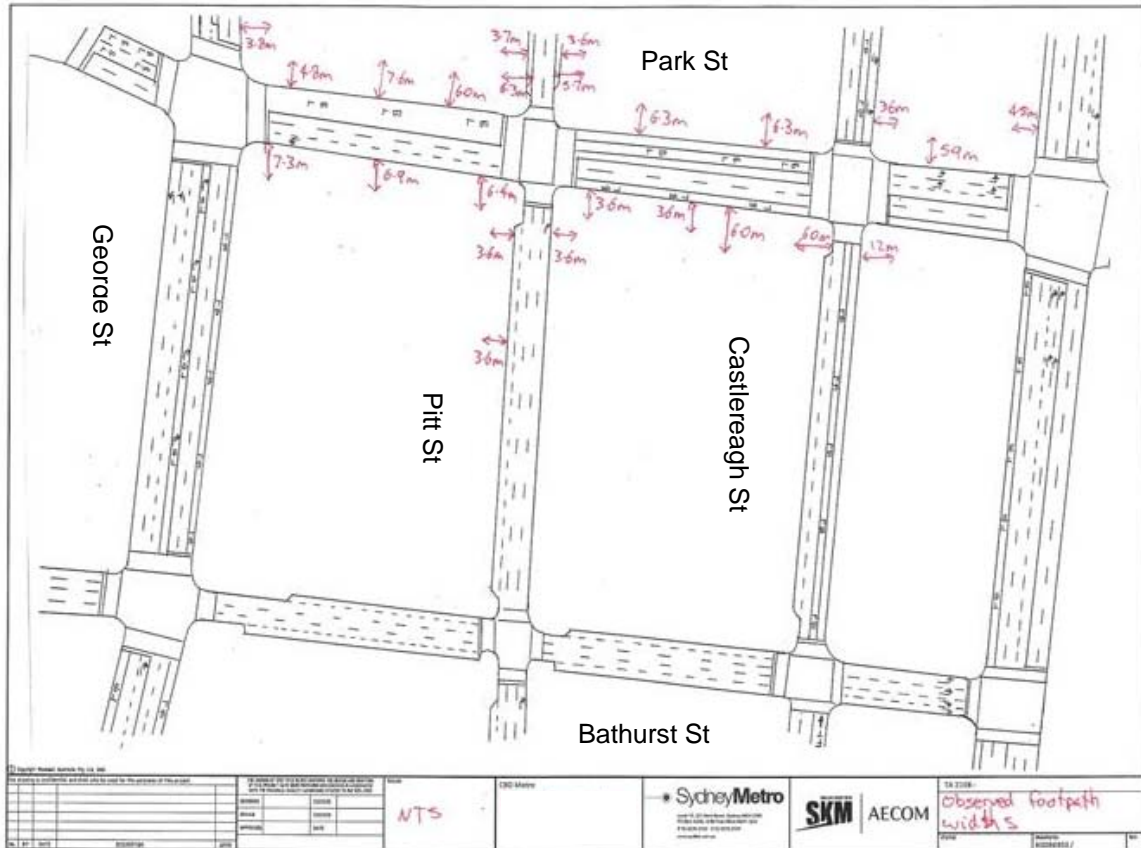
Requirement	Condition Requirements	Reference
Key issues	<p>General Construction Impacts – Consider the potential impacts associated with the construction of the project, and present a management framework for construction works to ensure that impacts are mitigated, monitored and managed. The EA must include consideration of, and a management framework for:</p> <ul style="list-style-type: none"> • construction noise and vibration, including a considered approach to scheduling construction activities including transport, blasting and tonal or impulse noise generating works). • construction traffic including a considered approach to route identification and scheduling of transport movements, having regard to <ul style="list-style-type: none"> - Alternatives to road transport; - The number, frequency and size of construction related vehicles (both passenger, commercial and heavy vehicles); - The nature of existing traffic on construction access routes (with consideration of peak traffic times and sensitive road users, including emergency vehicles and buses) - The need to close, divert or otherwise reconfigure elements of the road network associated with construction of the project; and - 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) 	<p>Individual Station Traffic Management Plans and Framework Traffic Management Plan.</p> <p>Noise Assessment (by others)</p> <p>Site Specific TMPs and Environmental Assessment</p> <p>Site Specific Tamps and Environmental Assessment</p> <p>Site specific TMPs</p> <p>Site specific TMPs</p> <p>Site specific TMPs</p> <p>Framework Traffic Management Plan and Environmental Assessment</p>

Requirement	Condition Requirements	Reference
	<p>The EA must also present a strategy for monitoring and mitigating traffic impacts, with a particular focus placed on those activities identified as having the greatest potential for adverse traffic flow, capacity or safety implications, and a broader, more generic approach developed for day-to-day traffic management.</p> <ul style="list-style-type: none"> • Spoil management • Water Impacts 	
<p>Consultation</p>	<p>The EA must reflect an appropriate and justified level of consultation with relevant parties during the preparation of the EA, including:</p> <ul style="list-style-type: none"> • local, State or Commonwealth government authorities and service providers such as the Roads and Traffic Authority, Ralcorp, 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). 	<p>The EA Report</p> <p>Framework Traffic Management Plan</p> <p>Environmental Assessment</p>

Appendix A Footpath Widths

Appendix A: Footpath Widths

Figure A.1: Observed Footpath widths in the vicinity of Town Hall Metro Station, May 2009

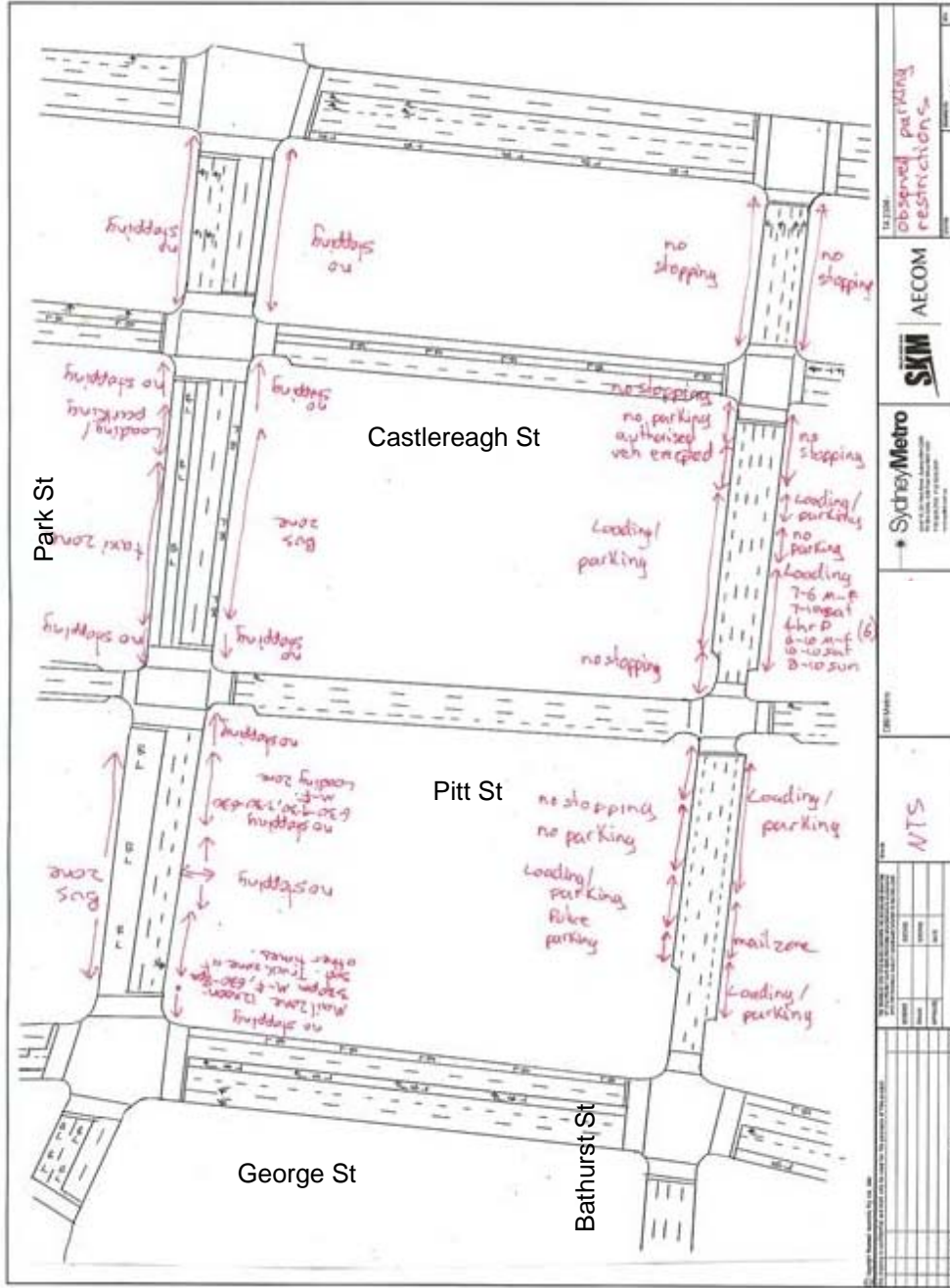


Source: AECOM/SKM/MVA Observations, May 2009

Appendix B Parking Restrictions

Appendix B: Footpath Widths

Figure B.1: Existing Parking Restrictions in the vicinity of Town Hall Metro Station



Source: AECOM/SKMMVA Observations, May 2009

Town Hall Station - Traffic Management Plan
 CBD Metro Transport and Access
 Town Hall Station - Traffic Management Plan
 E:\Appendix G TAZ108 Town Hall TMP Rev-4.doc
 Revision 2 29 July 2009

Table 2: Town Hall Station

Station Worksite	Location	Existing Kerb Use	Proposed Changes to Kerbside Parking restrictions	Loss of Loading / Parking and duration		Mitigation Strategy
				Enabling	Construction	
Town Hall Bathurst Street	Bathurst Street South side , between Pitt and Castlereagh Street	Loading and off peak parking	Remove existing loading/off peak parking to create a works zone and no stopping for driveway entrance to worksite	6 spaces	3 spaces	Nil proposed Conversion of lower priority kerb space (timed parking) to cover loss of loading/taxi etc.
				Duration of works	Duration of spoil activity, and potentially other PRI and IMO stages of work	Nil proposed
TH_C	Bathurst Street, between Kent and George Streets	Timed parking	Remove existing timed parking to allow relocation of loading/taxi rank/etc, and creation of a truck call forward location	5 spaces	5 spaces	Nil proposed
Town Hall Woolworths TH_A & B	Pitt Street, west side, south of Park Street	Timed loading/off peak parking (4 spaces) and potentially City of Sydney Ranger parking (3 spaces)	Remove existing restrictions to provide works zone and no stopping for driveway entrance	7 spaces,	7 spaces,	Conversion of lower priority kerb space (loading in Pitt St or parking in Bathurst St) to cover loss of ranger parking if loss is required
				Maximum parking loss. Duration of enabling, PRI and IMO stages of work	Maximum parking loss. Duration of enabling, PRI and IMO stages of work	Nil proposed Change to existing
	Park Street south side	Off peak loading (5 spaces)	Remove off peak loading to provide	5 spaces	5 spaces,	Nil proposed Change to existing
				Duration of enabling,	Duration of enabling, and	

Station Worksite	Location	Existing Kerb Use	Proposed Changes to Kerbside Parking restrictions	Loss of Loading / Parking and duration		Mitigation Strategy
				Enabling	Construction	
Site No	between Pitt and George Streets		works zone and no stopping for driveway egress point	and potentially PRI and IMO	potentially PRI and IMO	land use (removal of Woolworths etc) reduces need for loading in this area
Town Hall Pitt Street TH_D	Pitt Street west side north of Park Street	Loading	Remove existing indented loading bays to provide worksite/pedestrian management	4 spaces	4 spaces, Duration 6 month period of PRI and 6 month period of IMO. At least 2 spaces will be removed permanently.	Nil proposed. Potential strategies include reduced duration of loading at adjacent spaces to increase turnover
Town Hall Pitt Street TH_E	Pitt Street west side north of Bathurst Street	5 minute parking	Remove 2 spaces to provide worksite/pedestrian management	2 Spaces	2 Spaces	Nil proposed

Figure 2.1: Existing kerbside parking allocation

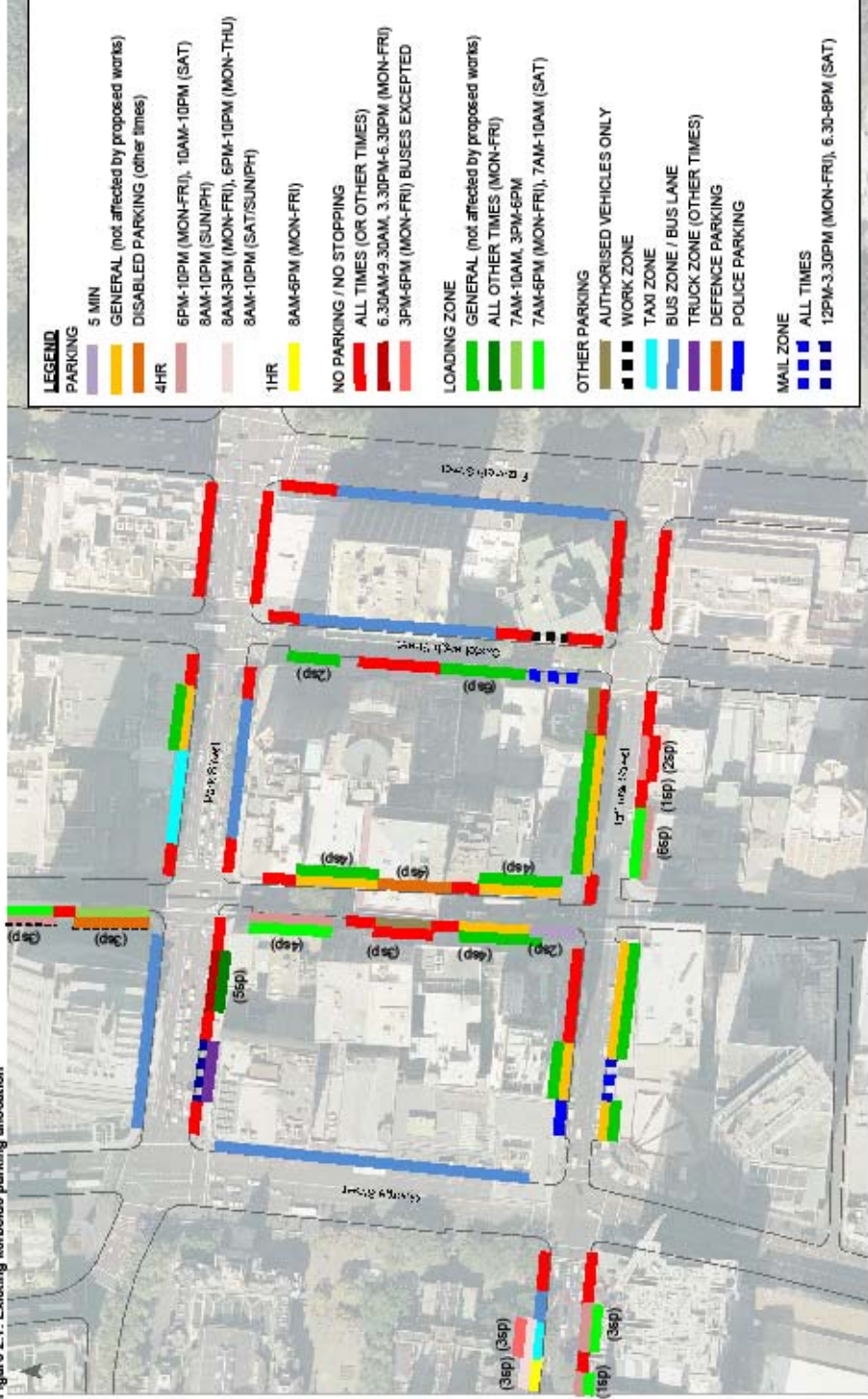


Figure 2.2: Proposed workfiles and changes to kerbside parking allocation



