SYDNEY INTERNATIONAL CONVENTION, EXHIBITION AND ENTERTAINMENT PRECINCT
DARLING SQUARE– SOUTH EAST PLOT

TRANSPORT & TRAFFIC IMPACT ASSESSMENT

FOR SSDA9

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DARLING HARBOUR LIVE

SYDNEY INTERNATIONAL CONVENTION, EXHIBITION AND ENTERTAINMENT PRECINCT: DARLING SQUARE (SOUTH EAST PLOT)

TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR SSDA9

Transport and Traffic Impact Assessment Report for Stage 2 State Significant Development Application (SSDA 9)

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Report No	TIA.S96.Final
Date	16 June 2017

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CONTENTS

APPENDICES

1 INTRODUCTION

This report supports an application made under section 96 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to modify Development Consent SSD 6633 relating to the development of the South East Plot of Darling Square which is part of the Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP).

Development Consent SSD 6633 was granted on 16 December 2016 by the delegate of the Minister for Planning for the following components of development:

- staged construction of 9 storey, 10 storey and 29 storey buildings, including a 6 storey podium, to be used for ground floor retail, above ground parking and residential apartments;
- various public domain and landscaping improvements;
- vehicle access from Harbour Street; and
- remediation works

This section 96 application (the Modification Application) constitutes the first modification to the consent. This Modification Application follows the approval and current assessment of a number of SSDAs within the SICEEP site as set out in Table 1.

Table 1 Status of initial SICEEP SSD DAs

DA No	Description of Application	Status
12_5752	SICEEP Core Facilities – Exhibition Centre, Convention Centre, The Theatre, Event Deck and Tumbalong Park	Approved: 22 August 2013
MOD 1	S96(1A) - various	Approved: 20 February 2014
MOD 2	S96(1A) – various	Approved: 18 July 2014
MOD 3	S96(1A) – various	Approved: 1 July 2015
13-5878	Darling Square Concept Proposal	Approved: 5 December 2013
MOD 1	S96(1A) – various	Approved: 26 November 2015
MOD 2	S96(1A) – various	Approved: 4 October 2015
6010	Western Plot (Student Accommodation – Building W2)	Approved: 7 May 2014
MOD 1	S96(2) – various	Approved: 1 April 2016
6013	North-West Plot (Public car park/ commercial office building)	Approved: 7 May 2014
MOD 1	S96(2) – various	Approved: 20 July 2015

DA No	Description of Application	Status
MOD 2	S96(1A) – various	Approved: 26 November 2015
MOD 3	S96(1A) – various	Approved: 23 December 2016
6011	South-West Plot (Mixed Use Residential Development)	Approved: 21 May 2014
MOD 1	S96(1A) – various	Approved: 27 July 2015
MOD 2	S96(1A) – various	Approved: 14 March 2017
6116	ICC Hotel	Approved: 15 June 2014
MOD 1	S96(1A) – various	Approved: 8 July 2015
6626	North-East Plot (Mixed Use Residential Development)	Approved: 16 April 2015
MOD 1	S96(1A) – various	Approved: 21 April 2017
6831	ICC Hotel fit-out, façade lighting system and subdivision	Approved: 16 October 2015
MOD 1	S96(1A) – various	Under Assessment
7133	Western Plot (Student Accommodation – Building W1)	Approved: 1 April 2016
6633	South East Plot (Mixed Use Residential Development)	Approved: 16 December 2016
MOD 1	**S96(1A) – various**	**Subject of this modification application**
7021	*North Plot (Community and Retail Building and Public Open Space)*	*Under Assessment*

2 OVERVIEW OF PROPOSED MODIFICATIONS

This Modification Application seeks approval for the following amendments:

- internal amendments to the podium levels, including design amendments to the retail tenancies and provision of additional car parking spaces within the approved maximum car parking rates;
- internal revisions to some residential apartments resulting in a reduction in the overall number of apartments; and

- minor external amendments at the upper and lower levels, including improved interfaces with the public domain.

A range of other minor amendments resulting from design development are illustrated on the amended Architectural Drawings. These changes are to be expected in any project, especially given the nature and scale of the approved South East Plot development.

3 BACKGROUND

The NSW Government considers that a precinct-wide renewal and expansion of the existing convention, exhibition and entertainment centre facilities at Darling Harbour is required, and is committed to Sydney reclaiming its position on centre stage for hosting world-class events with the creation of SICEEP.

Following an extensive and rigorous Expressions of Interest and Request for Proposals process, a consortium comprising AEG Ogden, Lend Lease, Capella Capital and Spotless was announced by the NSW Government in December 2012 as the preferred proponent to transform Darling Harbour and create SICEEP.

Key features of the Preferred Master Plan include:

- Delivering world-class convention, exhibition and entertainment facilities, including:
  - Up to 40,000m^2 exhibition space;
  - Over 8,000m^2 of meeting rooms space, across 40 rooms;
  - Overall convention space capacity for more than 12,000 people;
  - A ballroom capable of accommodating 2,000 people; and
  - A premium, red-carpet entertainment facility with a capacity of 8,000 persons.
- Providing a hotel complex at the northern end of the precinct.
- A vibrant and authentic new neighbourhood at the southern end of the precinct, now called ‘Darling Square’, including apartments, student accommodation, shops, cafes and restaurants.
- Renewed and upgraded public domain that has been increased by a hectare, including an outdoor event space for up to 27,000 people at an expanded Tumbalong Park; and
- Improved pedestrian connections linking to the proposed Ultimo Pedestrian Network drawing people between Central, Chinatown and Cockle Bay Wharf as well as east-west between Ultimo/Pyrmont and the City.

On 21 March 2013 a critical step in realising the NSW Government’s vision for the SICEEP Project was made, with the lodgement of the first two SSD DAs with the (now) Department of Planning and Environment. The key components of these proposals are outlined below.

Public Private Partnership SSD DA (SSD 12_5752)

The Public-Private Partnership (PPP) SSD DA (SSDA 1) includes the core facilities of the SICEEP Project, comprising the new, integrated and world-class convention, exhibition and entertainment facilities along with ancillary commercial premises and public domain upgrades. SSDA1 was approved on 22 August 2013.

Concept Proposal (SSD 13_5878)

The Concept Proposal SSD DA (SSDA 2) establishes the vision and planning and development framework which will be the basis for the consent authority to assess detailed development proposals within the Darling Square Site. SSDA2 was approved on 5 December 2013. The Stage 1 Concept Proposal approved the following key components and development parameters:

- Indicative staging of demolition and development of future development plots;
- Land uses across the site including residential and non-residential uses;
- Street and laneway layouts and pedestrian routes;
- Open spaces and through-site links;
- Six separate development plots, development plot sizes and separation, building envelopes, building separation, building depths, building alignments, and benchmarks for natural ventilation and solar access provisions;
- A maximum total gross floor area (non-residential and residential GFA)
- Above ground car parking including public car parking;
- Residential car parking rates;
- Design Guidelines to guide future development and the public domain; and
- A remediation strategy.

The Concept Proposal was modified on 26 November 2015 to increase the amount of non-residential GFA. This minor increase in GFA was allocated to the approved North-West Plot building to meet tenant requirements. In addition to the approval of SSDA2, the following approvals have been granted for various stages of Darling Square site:

- Darling Drive (part) development plot (SSDA3) for the construction and use of a residential building (student accommodation) and the provision of associated public domain works approved on 7 May 2014;
- North-West development plot (SSDA4) for the construction and use of a mixed use commercial development and public car park building and associated public domain works approved on 7 May 2014; and
- South-West development plot (SSDA5) – construction and use of a mixed use residential development and associated public domain works approved on 21 May 2014.
- North-East development plot (SSDA7) – construction and use of a mixed use residential development and associated public domain works approved on 16 April 2014.

Approval was also granted on 15 June 2014 for SSDA6 which includes the construction and use of the International Convention Centre (ICC) Hotel and provision of public domain works. Approval was also granted for SSDA8 on 16 October 2015 which comprised the ICC Hotel fitout, external lighting and subdivision.

This report has been prepared to support a detailed Stage 2 SSD DA for mixed use development and associated public domain works within Darling Square (SSDA 9), consistent with the Concept Proposal (SSDA 2).

4 SITE DESCRIPTION

The SICEEP Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

With an area of approximately 20 hectares, the SICEEP Site is generally bound by the Light Rail Line to the west, Harbourside shopping centre and Cockle Bay to the north, Darling Quarter, the Chinese Garden and Harbour Street to the east, and Hay Street to the south (refer to Figure 1).

The Darling Square Site is:

- located in the south of the SICEEP Site, within the northern portion of the suburb of Haymarket;
- bounded by the Powerhouse Museum to the west, the Pier Street overpass and Little Pier Street to the north, Harbour Street to the east, and Hay Street to the south; and
- irregular in shape and occupies an area of approximately 37,701m^2.

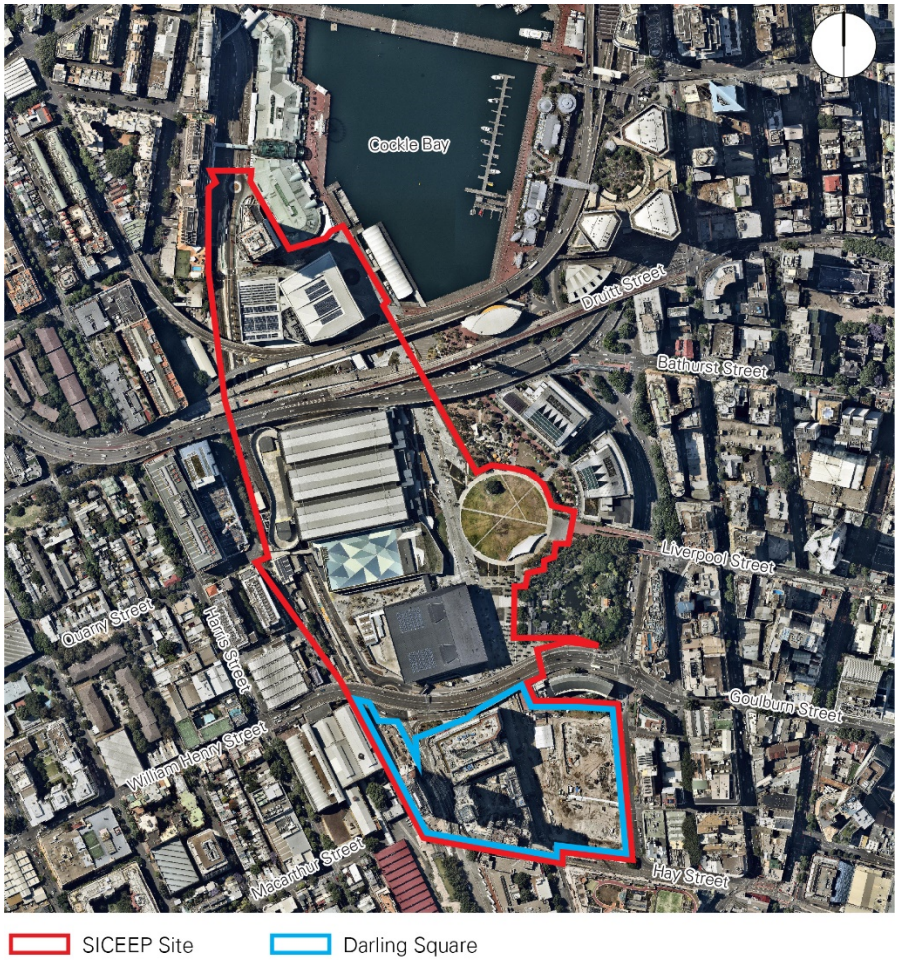


Figure 1 Aerial Photograph of the SICEEP Site

The Concept Proposal DA provides for six (6) separate development plots across the Darling Square Site (refer to Figure 2):

1 North Plot;

2 North East Plot;

3 South East Plot;

4 South West Plot;

5 North West Plot; and

6 Western Plot (Darling Drive).

The Modification Application Site relates to the South East Plot and surrounds as detailed within the drawings submitted in support of Modification Application. Figure 2 illustrates the South East Plot in the approved Concept Proposal.

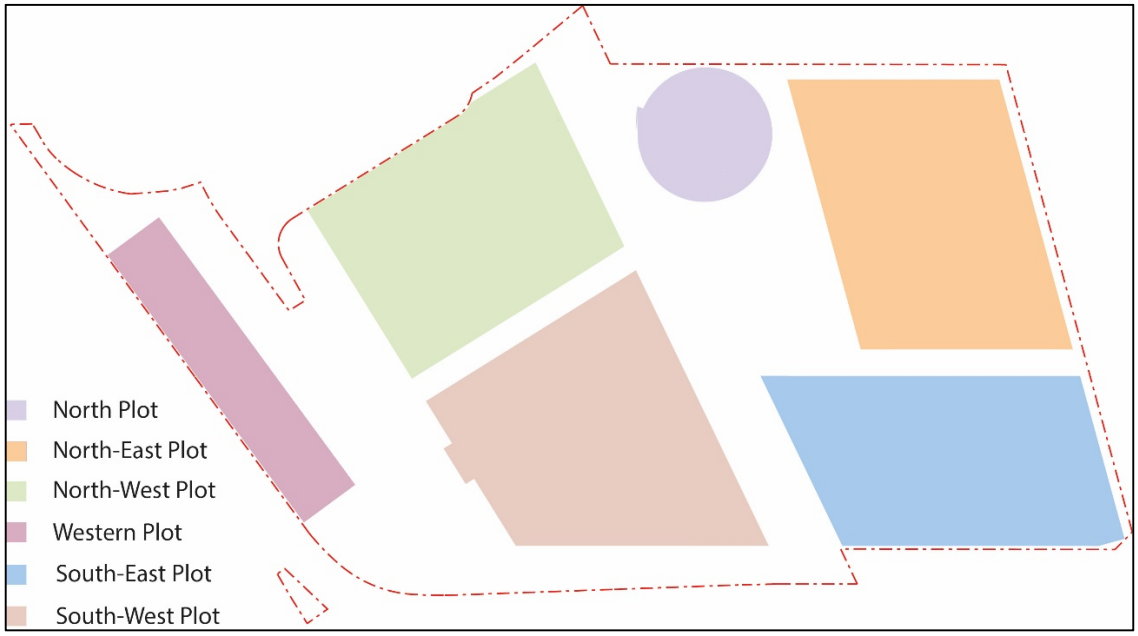


Figure 2 Concept Proposal Development Plots

5 PLANNING APPROVALS STRATEGY

The SICEEP Project has resulted in the lodgement of numerous SSD DAs for the various components of the redevelopment project. Future applications will continue to be lodged in accordance with the Concept Proposal SSD DA for the remaining development plots of Darling Square Site.

6 PURPOSE OF THIS REPORT

This report is being submitted to support the Section 96 Mofidification Applcation of the South East Plot of Darling Square comprising of three residential buildings (SE1, SE2, and SE3) together with public domain works. This report should be read in conjunction with the Transport and Traffic Impact Assessment report submitted with SSDA2 which is included as Appendix A.

The Secretary's Environmental Assessment Requirements (SEARs) issued for development approval for the Mixed Use Residential Development (South East Plot - SSD 6633) were issued on 19 August 2014.

Section 8 of the SEARs require the following:

Table 2 Secretary's Environmental Assessment Requirements

Issue Description	Relevant Section in the Main Report	Relevant Section in this Report	Comments
Address the impact of traffic and pedestrian volumes on surrounding road network including intersections using appropriate traffic modeling analysis based on the worst cumulative traffic impacts including a sensitivity analysis	Section 6, Section 7, Section 8, Section 9	Section 9.2	Traffic generation associated with the SE plot relates to the vehicle movements to and from the residential buildings and the retail component.
Provide details of any upgrading or road improvement works required to accommodate the proposed development	Not applicable	Not applicable	No road improvement works are required or proposed to accommodate the proposed development
Address any impacts on the Light Rail corridor	Not applicable	Not applicable	The development is not anticipated to impact on the Light Rail corridor
Justify the level of car parking provided on the site	Section 5.4	Section 8.2	A total of 274 spaces will be provided in the South East plot, including: - 269 residential spaces; - 2 loading bays; - 2 service bays; and - 1 car charging station
Provide details of measures to encourage sustainable transport measures, including end of trip cyclist facilities, pedestrian and cycle connections and travel plans	Section 10	Section 8.2.4, Section 8.3 and Section 8.4	Cycle and pedestrian connections will be enhanced through the provision of new linkages. End of trip facilities are incorporated in the design of the SE buildings
Address the impacts from construction traffic to the surrounding area and public transport services in the vicinity including the cumulative impact of construction activities from other sites in the locality	Section 9	Section 10	Preliminary Construction Management Plans have been prepared for the new building works. These plans outline how potential impacts may be mitigated and will be regularly updated to address any new outcomes as the works progress.

Issue Description	Relevant Section in the Main Report	Relevant Section in this Report	Comments
Provide details of the parking provision and arrangements during the demolition/construction period	Section 9	Section 10.6	A preliminary Construction Management Plan has been prepared. On-site parking will not be allowed during the construction. Measures will be implemented to promote public transport use.
Provide details of the pedestrian and cyclist connections to the surrounding area including public transport linkages; and	Section 5.7, 5.8, 3.3	Section 7 and Section 8.3 and Section 8.4	Cycle and pedestrian connectivity will be enhanced in the east west direction via new pedestrian crossing and in the north-south direction via the cycle/ pedestrian shared path on the west side of Darling Drive which connects into existing and proposed networks.
Address road safety at key intersections and locations subject to heavy vehicle movements and high pedestrian activity	Section 8	Section 9.3 and Section 10.8	Road safety measures have been integrated in the proposed design of those intersections subject to heavy vehicle movements and high pedestrian activity. The road layout supports the modelled heavy vehicle movements and pedestrian activity is supported through new and upgraded signalised pedestrian crossing facilities and generous verges. The construction management plan will address pedestrian and heavy vehicle movements during construction whilst post construction heavy vehicle movements (generally associated with the operations of the core facilities) have been facilitated in the proposed design and will be further addressed through the road safety audit process

7 EXISTING TRANSPORT CONDITIONS

The existing transport conditions for Darling Square are assessed as part of the Transport and Traffic Impact Assessment report submitted with SSDA2 as attached in Appendix A.

8 DEVELOPMENT COMPONENTS

The development components relevant to the South East plot are highlighted in the sections below.

8.1 OVERVIEW

The South East plot will consist of a total of 390 apartments in Studio, 1, 2, 3 and 4 bedroom configurations with retail development on the ground floor of the towers. The units will be built within three residential towers with frontages on Hay Street (SE1 & SE3 towers) and the Boulevard (SE2 Tower). The distribution of the units is detailed in Table 3.

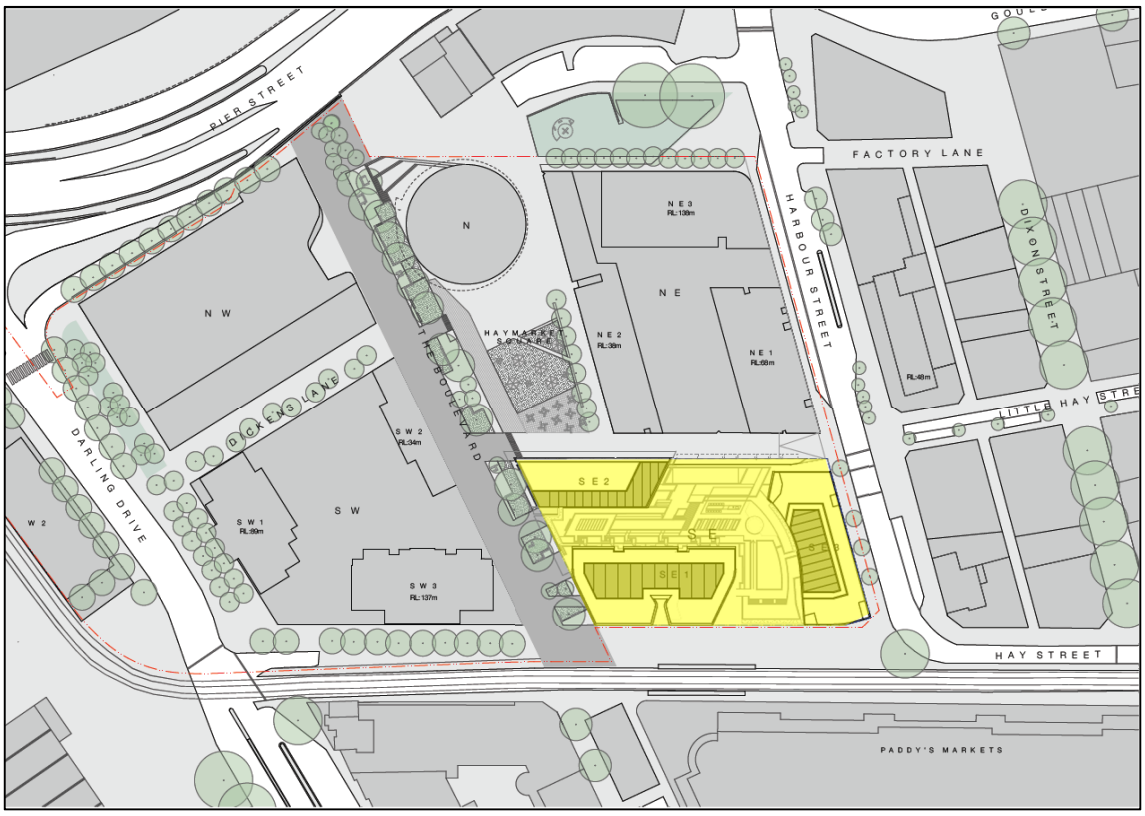


Figure 3 Site Plan

Table 3 South East Plot Development Mix

Apartment Configuration	Total	Mix
Studio	20	5%
1B	181	47%
2B	175	45%
3B	13	3%
4B	1	<1%
Total	**390**	**100%**

8.2 PARKING PROVISION

Parking provision for Darling Square will consist of four blocks (NW, SW, NE and SE) with a total provision of approximately 1,163 car park spaces. In addition, a public carpark with 400 spaces will also be provided in the northwest block and will be available for visitors to the SICEEP Precinct.

A breakdown of the car park spaces is shown in Table 4.

Table 4 Proposed Parking Provision for the Darling Square Precinct

Parking Location	Proposed Car Parking Bays	
Residential / retail / student accommodation / commercial car park (Darling Square) [1]		
North West Office/Commercial	50	
North East residential	445	
North Lot	0	
South East residential	269	
South West residential	399	
Total provision within Darling Square Precinct		***1,163***
North West Public Carpark	400[2]	

[1] Approved + Proposed Design for Darling Square

[2]This public car park will consist of 400 car park spaces to be delivered under Darling Square and will be available for visitors for the SICEEP precinct.

For the South East residential block, a total of 269 car park spaces will be provided as part of the Modification Application. This is an additional 4 car parking spaces from the approved number of 265 car parking spaces outlined in the Development Consent SSD 6633. This remains consistent with the parking ratios proposed in SSDA2 Stage 1 Concept Proposal approval (SSD 5878).

On-site car parking provision for the South East plot has been considered in light of guidelines listed in the RMS *Guide to Traffic Generating Development (Section 5 – Parking Requirements for Specific Land Uses),* the City of Sydney DCPs, the parking ratios approved for Stage 1 (SSD 5878) - Condition B19.

8.2.1 PARKING GUIDELINES FOR RESIDENTIAL DEVELOPMENT

Stage 1 (SSD 5878) Approval

Consent was granted to the SSDA2 Concept Proposal for Darling Square in December 2013. As part of the Approval, the conditions stipulate maximum on site residential car parking provisions for future Stage 2 SSDAs.

Condition B19 states that on site residential car parking shall be provided at the following maximum rates:

- Studio 0.1 spaces/unit

- 1 bed / 1 bed + study 0.5 spaces /unit
- 2 bed / 2 bed + study 1.0 spaces/unit
- 3 bed+ 1.5 spaces /unit

The parking rates approved allow a maximum provision of 290 spaces, as shown in Table 5.

Table 5 SSD 5878 Condition B19 – Maximum On-Site Residential Car Parking Provision

Type	No. of Units	Proposed Parking Rate	Maximum No. of Spaces
Studio	20	0.1	2
1Bed	181	0.5	91
2Bed	175	1.0	175
3Bed	13	1.5	20
4Bed	1	1.5	2
Total	390		290

The development proposes a total of 269 spaces (listed in Table 6), which is less than the allowable maximum.

Table 6 Proposed Maximum Car Spaces

Type	No. of Spaces
L02 Podium	69
L03 Podium	66
L04 Podium	67
L05 Podium	67
Total	269

8.2.2 PARKING PROVISIONS FOR RETAIL DEVELOPMENT

No provision for parking is being proposed for the retail development.

8.2.3 ACCESSIBLE PARKING

The proposal provides a total of 10 accessible parking spaces. These spaces will be designed in accordance with AS2890.6.

8.2.4 BICYCLE PARKING

The Planning Guidelines for Walking and Cycling suggests that bicycle parking for residential apartment buildings be provided at the following rates:

- 20-30% of units for residents,
- 5-10% of units for visitors

The above provision is equivalent to approximately 98 – 156 bicycle parking spaces.

The development will provide a storage cage for each apartment of sufficient size that it can be used for bicycle storage for the residents, totaling 390. In addition, 45 bicycle parking spaces will be provided for visitors and retail on the ground floor with an additional 20 in the external area fronting Little Hay Street on the south side. This total provision exceeds the guideline noted above.

8.2.5 SERVICING

The development proposal provides 2 loading vehicle bays and 2 service vehicle parking. A swept path assessment was undertaken to demonstrate access and maneuverability within the basement parking. The swept path diagrams are shown in Appendix B.

8.3 PEDESTRIAN NETWORK

The design of the pedestrian network for the South East plot is consistent with SSDA2 via the north-south promenade as part of the “Boulevard” and the existing external pedestrian linkages providing interfacing with the pedestrian network to the west and east of the South East plot.

The Traffic Transport and Access Plan for the whole precinct illustrate the proposed pedestrian connections and linkages.

8.4 CYCLE NETWORK

A detailed Cycle Network assessment was undertaken as part of SSDA1 and SSDA2 and new linkages were identified to accompany the development works of SSDA1 and SSDA2. Cycle connections will be provided along Darling Drive as part of the realignment and reconfiguration of Darling Drive and these proposals form part of the overall improvement to the cycle network serving the South East plot and precinct as a whole. The new and improved linkages will improve connectivity in the Precinct and improve access to public transport.

9 TRAFFIC IMPACT ASSESSMENT

9.1 TRAFFIC GENERATION AND TRIP DISTRIBUTION FOR THE SOUTH EAST PLOT

An indication of the peak hour traffic generation potential of the future development within The Precinct has been based on the Roads and Maritime Service *Guide to Traffic Generating Developments" (2002)*. The RMS's Guide provides a series of traffic generation rates for a variety of land uses based on generic surveys undertaken by the RMS. These rates are generally applied to the Gross Floor Area (GFA) or Gross Leasable Floor Area (GLFA).

The traffic generation rates applied in the previous assessment of SSDA 1 and SSDA2 referred to typical peak hour traffic generation rates stipulated in the RMS Guide, Version 2.2 (October 2002). The rates applied for the proposed land uses of Darling Square Precinct were as follows:

- Residential evening peak vehicle trips: 0.24 vehicle trips per hour for each unit
- Retail evening peak hour vehicle trips: 56[1] vehicle trips per hour per 1000sqm GLFA

RMS TDT 2013/04, released in the latter part of 2013 provides updated traffic generation rates for residential, retail and office/commercial developments blocks. The generation rates are based on new surveys conducted in 2010-12 on various developments within Sydney, with locations close to public transport. The updated rates suggest lower vehicle trip generation trends and a reduction by 20% of the previous rates for high density residential developments. The traffic generation rate for residential development is:

- Residential morning peak vehicle trips: 0.19 vehicle trips per hour for each unit
- Residential evening peak vehicle trips: 0.15 vehicle trips per hour for each unit

This generally implies that the rates used in the previous traffic modelling are considered conservative

Trip generation associated to minor retail and active uses in a location similar to the South East plot and within a precinct occupied by residential uses and office/commercial development are generally likely to be linked trips rather than 'standalone' or primary trips. For the purpose of this assessment, it is assumed that the incidence of linked and multi-purpose trips is potentially high and the proportion of non-car trips will dominate. Consistent with SSDA1 and SSDA2 assessment, the minor retail land uses are considered to generate non-car trips.

It should be noted that initial modelling undertaken as part of the SSDA1 and SSDA2 assumed an indicative mix for the Darling Square Precinct. For the purpose of this Stage 2 DA, traffic assessment takes into account the new design layout proposed for the South East plot consisting of a total of 390 units and 269 car park spaces. The relative difference in traffic generation is minimal and not expected to alter the results of the modelling undertaken as part of SSDA1 and SSDA2.

Application of the updated traffic generation rates to the proposed development yields a weekday peak period total traffic generation potential of 15 In/59 Out during the morning peak period 47

[1] RMS Guide to Traffic Generating Developments, Friday peak period is considered in order to be consistent with SSDA1 modelling assumptions. Traffic generation prediction method uses floor area categories and floor areas where specialty shops and secondary retail are assigned a trip generation factor of 56 vehicle trips per 1000 m^2 of GLFA. As a general guide 100 m^2 GFA equals 75 m^2 GLFA.

In/12 Out during the evening peak period. These traffic generation projections have been based on an arrival/departure split of 80% In/20% Out for residential and 50% In/50% Out for retail during the evening peak period. This traffic generation is 37% less than what was assessed in SSDA 1 and SSDA2. Although the number of units have increased, the updated traffic generation rates from the RMS have substantially decreased.

For the assessment, the following traffic distribution was assumed. This distribution is assumed to still be valid for the current assessment.

- 30% trips anticipated to arrive from western suburbs via M4 Western Distributor;
- 10% trips anticipated to arrive from western suburbs via Great Western Highway;
- 30% trips anticipated to arrive from northern suburbs via M4 Western Distributor and then through Darling Drive and Ultimo Road;
- 20% trips anticipated to arrive from southern suburbs by using Eastern Distributor and then through north Darling Drive and Ultimo Road; and,
- 10% trips anticipated to arrive from southern suburbs by using Great Western Highway and then through Harris Street and Ultimo Road.

9.2 NETWORK CAPACITY AND LEVEL OF SERVICE (LOS)

A micro-simulation model was developed for the core study area bounded by Darling Drive to the west, Harbour Street to the east, Hay Street to the south and Pyrmont Bridge to the north. The traffic modelling encompasses the Whole of Precinct (WOP) and investigates cumulative impacts from the development of the PPP, Darling Square and the ICC Hotel. The future modeling scenario represents 'worst case scenario' analysis and accounts for design proposals developed at this stage. Details of the modelling are reported in the SSDA2 Traffic and Transport Report (attached in Appendix A). The network modelling was then supplemented by more detailed assessments of selected key intersections using the SIDRA intersection modelling software to test intersection performance at the isolated level during the selected peak hours and to identify potential measures to achieve improved outcomes.

9.2.1 EXISTING INTERSECTION OPERATION

It should be noted that the modelling undertaken for the assessment takes into account the cumulative traffic for the development of the SICEEP Precinct as a whole. The results of the analysis incorporate impacts from the various components of the development.

The criteria for evaluating the operational performance of intersections are provided by *the RMS Guide to Traffic Generating Developments, Version 2.2, October 2002*. The criterion is based on a qualitative measure (i.e. Level of Service), which is applied to each average delay band.

The 'Level of Service' is the standard used to measure the performance of the intersection operation. This is defined as the qualitative assessment of the quantitative effect of factors such as speed, traffic volume, geometric features, delays and freedom of movement.

The intersections were assessed for existing operational performance using SIDRA Intersection Analysis. SIDRA Intersection calculates the amount of delay experienced by vehicles using an intersection, and gives a Level of Service rating. The 'Level of Service' (LOS) indicates the

relative performance of that intersection with regard to the average delay (in seconds per vehicle) experienced by vehicles at the intersection.

At a signalised intersection, the Level of Service (LoS) criteria are related to average intersection delay measured in seconds per vehicle. The RMS Guide has recommended that with roundabout, “Stop” and “Give Way” sign control intersections, the LoS value is determined by the critical movement with the highest average delay.

Table 7 summarises intersection LoS criteria used to assess the intersection performance.

Table 7 LOS Criteria

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

In general, SIDRA predicts intersection performance for the following key parameters:

- Degree of saturation (DoS);
- Average delays to intersection;
- Level of service (LoS) determined from LoS criteria; and
- Queue length.

Intersection analysis of the key intersections adjacent to the site was undertaken. The results of the modelling for existing traffic are shown in Table 8 and Table 9. The results of the modelling reveal that on the overall the key intersections perform at an acceptable LoS on a typical Friday or Saturday PM peak.

Table 8 and Table 9 present the summary of existing level of service (LoS) for the key intersections of the precinct.

Table 8 Intersection Performance of Existing Friday PM Peak Condition (2012)

Intersection	Intersection Control	Approach	Average Delay Approach (sec/veh)	Approach LoS	Overall Average Delay (sec/veh)	Overall LoS
Darling Dr / Pier street	Roundabout	Darling Dr North	3.6	A	10.2	A
		Pier St (off-ramp) East	8.9	A		
		Existing SEC Car Park Exit	5.8	A		
		Darling Drive South	7.9	A		
Darling Dr / SW Plot Car Park Access	Signalised	Darling Dr North	19.4	B	23.0	B
		SW Plot Car Park Access	46.5	D		
		Darling Dr South	16.4	B		
Pier St / Harbour St / Goulburn St	Signalised	Harbour St North	61.4	E	44.2	D
		Goulburn St East	28.6	C		
		Harbour St South	51.3	D		
		Pier St West	34.2	C		
Harbour St / Liverpool St	Signalised	Harbour St North	24.3	B	34.0	C
		Liverpool St East	42.3	C		
		Harbour St South	31.8	C		
		Car Park Exit (West)	65.8	E		
Darling Dr / Ultimo Road	Signalised	Ultimo Road West	13.8	A	17.7	B
		Darling Drive North	24.5	B		
		Ultimo Road East	13.5	A		

Table 9 Intersection Performance of Existing Saturday PM Peak Condition (2012)

Intersection	Intersection Control	Approach	Average Delay Approach (sec/veh)	Approach LoS	Overall Average Delay (sec/veh)	Overall LoS
Darling Dr / Pier street	Roundabout	Darling Dr North	3.6	A	10.4	A
		Pier St (off-ramp) East	9	A		
		Existing SEC Car Park Exit	6.1	A		
		Darling Drive South	9.6	A		
	Signalised	Darling Dr North	19.4	B	23.0	B

Intersection	Intersection Control	Approach	Average Delay Approach (sec/veh)	Approach LoS	Overall Average Delay (sec/veh)	Overall LoS
Darling Dr / SW Plot Car Park Access		SW Plot Car Park Access	46.5	D		
		Darling Dr South	16.5	B		
Pier St / Harbour St / Goulburn St	Signalised	Harbour St North	53.9	D	42.4	C
		Goulburn St East	31.3	C		
		Harbour St South	51.6	D		
		Pier St West	31.2	C		
Harbour St / Liverpool St	Signalised	Harbour St North	19.1	B	27.5	B
		Liverpool St East	44.8	D		
		Harbour St South	20.5	B		
		Car Park Exit (West)	58.2	E		

9.2.2 FUTURE OPERATIONAL PERFORMANCE

The results of the modelling for the future network with the proposed development are presented in Table 10 and Table 11 below:-

Table 10 Future Intersection Performance (Friday Event)

Intersection	Intersection Control	Approach	Average Delay Approach (sec/veh)	Approach LoS	Overall Average Delay (sec/veh)	Overall LoS
Darling Dr / Pier Street	Roundabout	Darling Dr North	4.1	A	9.4	A
		Pier St (off-ramp) East	9.4	A		
		Darling Drive South	8.9	A		
Darling Dr / SW Plot Car Park Access (Hay Street)	Signalised	Darling Dr North	8.7	A	10.7	A
		SW Plot Car Park Access[1]	71.7	F		
		Darling Dr South	8.3	A		
Pier St / Harbour St / Goulburn St	Signalised	Harbour St North	40.7	C	33.8	C
		Goulburn St East	35.1	C		
		Harbour St South	38.7	C		
		Pier St West	23.0	B		
	Signalised	Harbour St North	23.8	B	35.5	C

Intersection	Intersection Control	Approach	Average Delay Approach (sec/veh)	Approach LoS	Overall Average Delay (sec/veh)	Overall LoS
Harbour St / Liverpool St		Liverpool St East	45.0	D		
		Harbour St South	33.9	C		
		Car Park Exit (West)	70.8	F		
Darling Dr / Ultimo Road	Signalised	Ultimo Road West	18.8	B	21.6	B
		Darling Drive North	18.9	B		
		Ultimo Road East	24.8	B		

[1]Exiting vehicles from the carpark will experience relative delays due to green time priority given to through traffic on Darling Drive. The volume of vehicles exiting the carpark is expected to be minimal compared to volume of vehicles on Darling Drive

Table 11 Future Intersection Performance (Saturday Event)

Intersection	Intersection Control	Approach	Average Delay Approach (sec/veh)	Approach LoS	Overall Average Delay (sec/veh)	Overall LoS
Darling Dr / Pier Street	Roundabout	Darling Dr North	4.3	A	9.9	A
		Pier St (off-ramp) East	9.7	A		
		Darling Drive South	20.6	B		
Darling Dr / SW Car Park Access (Hay Street)	Signalised	Darling Dr North	9.3	A	10.5	A
		Future SW Car Park Access[1]	62.7	E		
		Darling Dr South	7.1	A		
Pier St / Harbour St / Goulburn St	Signalised	Harbour St North	49.6	D	38.4	C
		Goulburn St East	33.0	C		
		Harbour St South	44.7	D		
		Pier St West	24.1	B		
Harbour St / Liverpool St	Signalised	Harbour St North	15.1	B	20.4	B
		Liverpool St East	29.9	C		
		Harbour St South	17.9	B		
		Car Park Exit (West)	33.5	C		

[1]Exiting vehicles from the carpark will experience relative delays due to green time priority given to through traffic on Darling Drive. The volume of vehicles exiting the carpark is expected to be minimal compared to volume of vehicles on Darling Drive

The results indicate that with development traffic, the key intersections will perform at an acceptable LoS on a typical Friday or Saturday PM peak.

9.3 PEDESTRIAN SAFETY ON HARBOUR STREET

Crash data was supplied by the RMS for a five-year period from July 2007 to June 2012 inclusive. The crash statistics revealed 19% of the crashes on Harbour Street involved a pedestrian of which 5 of the 11 records occurred in the section between Hay Street and Goulburn Street. This section has one way vehicle directional flow and no pedestrian crossing except at the intersection of Pier Street / Harbour Street / Goulburn Street. Records from previous studies reported medium to heavy pedestrian activity in the block east of the SEC precinct due to the proximity of Chinatown.

As part of the Chinatown Public Domain Plan a pedestrian crossing facility has been provided across Harbour Street, south of Goulburn Street.

Other pedestrian crashes on Harbour Street were observed to occur at the intersections with Goulburn Street, Liverpool Street, Day Street and Bathurst Street. These intersections have pedestrian crossing facilities integrated with the signal phasing.

Pedestrian safety measures will be incorporated in the detailed construction management plans and will be regularly reviewed and updated as required.

10 CONSTRUCTION TRAFFIC IMPACT AND MANAGEMENT

10.1 BACKGROUND

A Preliminary Construction Management Plan has been prepared by Lend Lease Project Management and Construction (LLPM&C). The document outlines the indicative management plans relating to the construction works associated with SSDA9.

This section presents excerpts from the above document relevant to Traffic and Pedestrian Management during construction of the South East Plot, including description and layouts of the planned mitigation arrangements demonstrating how, during the development, the pedestrian and vehicular movements will be addressed to minimise impact.

10.2 SITE BOUNDARY

Figure 4 below depicts the various hoarding locations proposed for the SE plot and identifies areas indicatively accessible to the general public and areas cordoned off for the construction works.

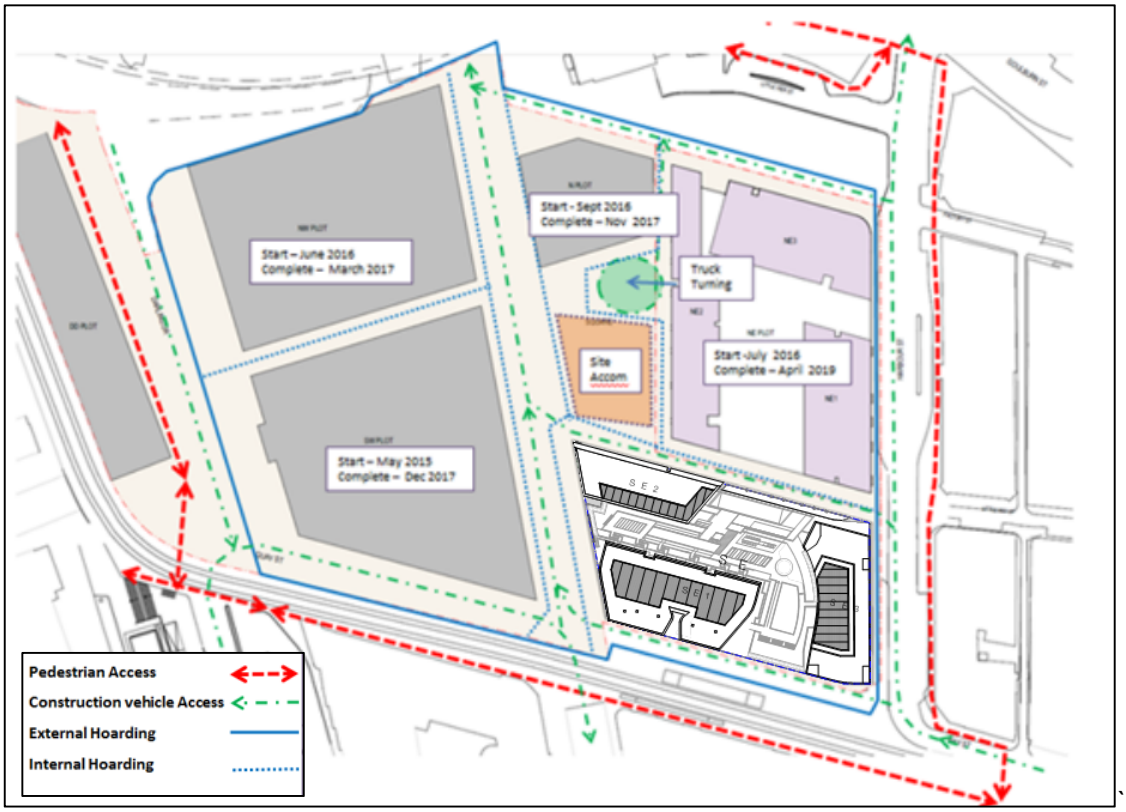


Figure 4 Site Boundaries during Construction of the Darling Square Precinct

10.3 CONSTRUCTION STAGING

10.3.1 CONSTRUCTION PROGRAMME

Construction commenced in February 2017 and expected to finish in March 2019. The construction programme duration for the entire SE plot (SE 1, SE 2 & SE 3 building) is 27 months.

10.3.2 DEMOLITION OF SYDNEY ENTERTAINMENT CENTRE

The demolition of the Sydney Entertainment Centre commenced in January 2016, prior to commencement of the NE plot and was completed in June 2016.

10.3.3 STAGED DELIVERY OF SE PLOT

The SE Plot is to consist of three residential towers. The SE2 and SE3 buildings are anticipated to be constructed concurrently with SE1 however with a one month interval for the start of each building. It is proposed that construction works will commence first with SE1 to be followed by SE3 and then SE2.

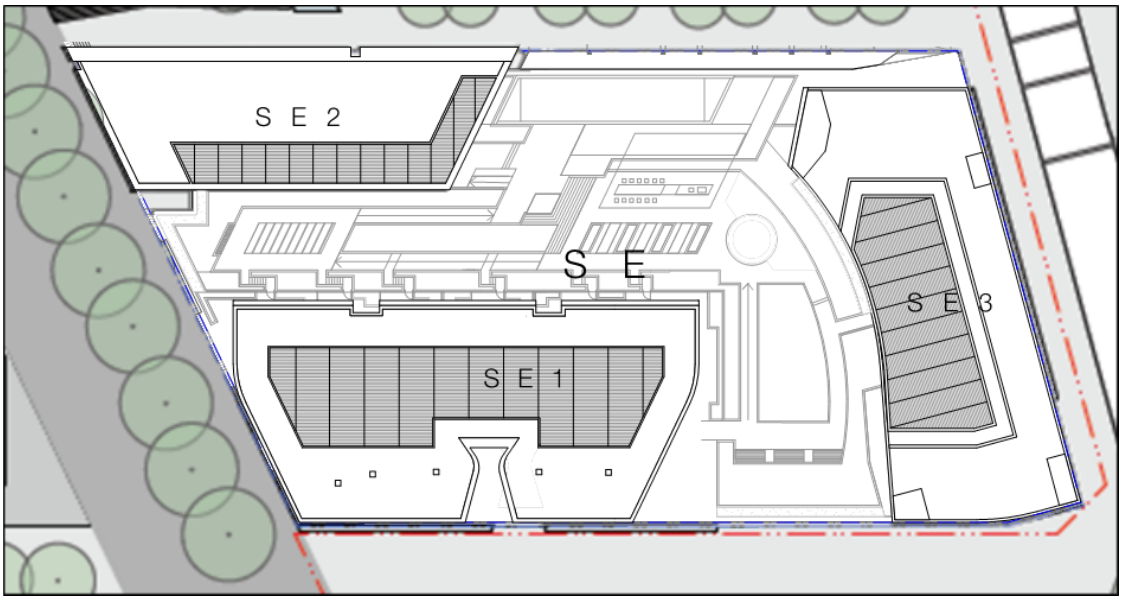


Figure 5 Site Layout of Residential Towers

10.4 CONSTRUCTION VEHICLE GENERATION

The traffic generation during construction is estimated to be in the range of 1 truck delivery per day to a maximum of 38 truck deliveries per day with the peak period to occur during the month of April 2018.

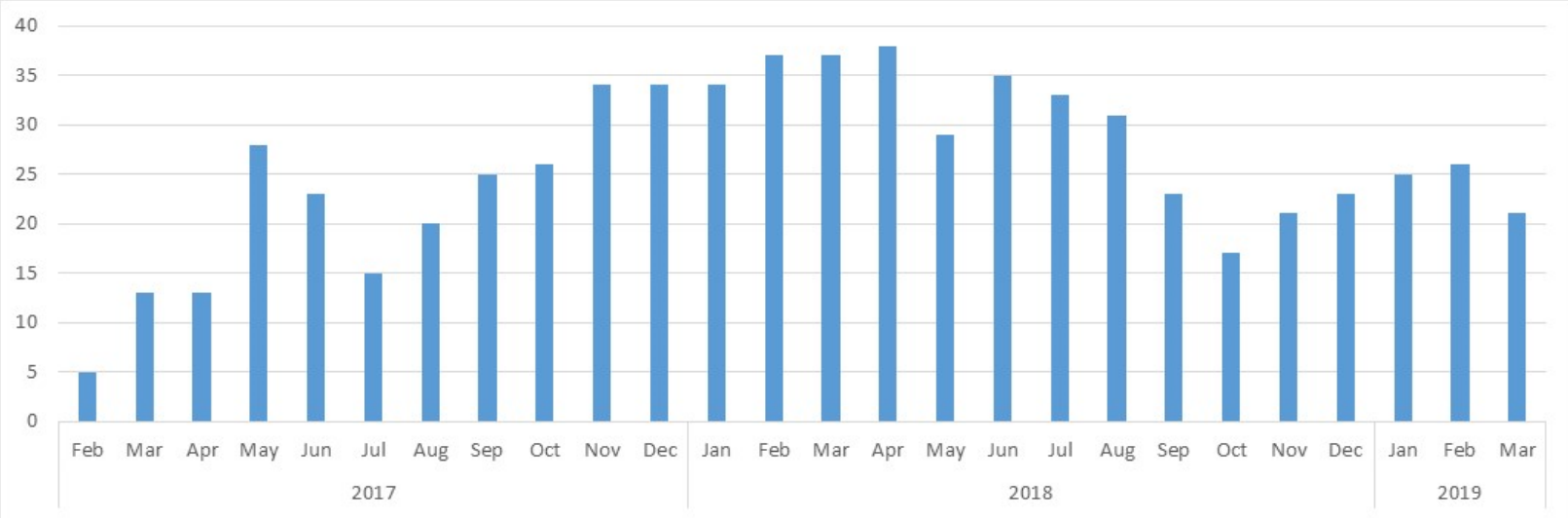
Table 12 Construction Vehicle Generation

Construction Phase	Period	Vehicle Generation
Site Establishment	Feb 2017 to Mar 2017	1 - 5
Civil Works and Sub Structure	Mar 2017 to Jun 2017	7 - 15
Ground Floor Slabs	May 2017 to Jul 2017	3 - 13
Structure	Jun 2017 to Sept 2018	3 - 27
Façade	Aug 2017 to Nov 2018	1.5 – 2.5
Services and Fit out	Dec 2017 to Feb 2019	2 – 7
External Works	Nov 2018 to Mar 2019	5 – 12
Other	Nov 2017 to Mar 2019	4 – 12

A monthly breakdown is presented Table 12.

Table 13 Indicative Construction Duration and Associated Truck Movements

	2017											2018												2019		
Stage	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Site Establishment	5	5																								
Civil Works & Sub Structure		8	13	15	7																					
Ground Floor Slabs				13	13	10																				
Structure					3	5	18	23	24	27	25	25	27	27	27	15	21	18	16	5						
Façade							2	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2				
Services & Fitout											2	2	2	2	3	6	6	7	7	7	7	6	5	3	2	
External Works																						5	10	12	12	12
Other										4	4	4	5	5	5	5	5	5	5	8	8	8	8	10	12	9
Deliveries per day per month	**5**	**13**	**13**	**28**	**23**	**15**	**20**	**25**	**26**	**34**	**34**	**34**	**37**	**37**	**38**	**29**	**35**	**33**	**31**	**23**	**17**	**21**	**23**	**25**	**26**	**21**



10.5 CONSTRUCTION VEHICLE ACCESS

The proposed construction heavy vehicle access will be via Sussex Street, right turn onto Hay Street and into Harbour Street to access the site. Vehicles leaving site will do so in a forward motion along Harbour st and left into Pier Street or continue on towards the Harbour Bridge or Cross city Tunnel. This is shown in Figure 6.

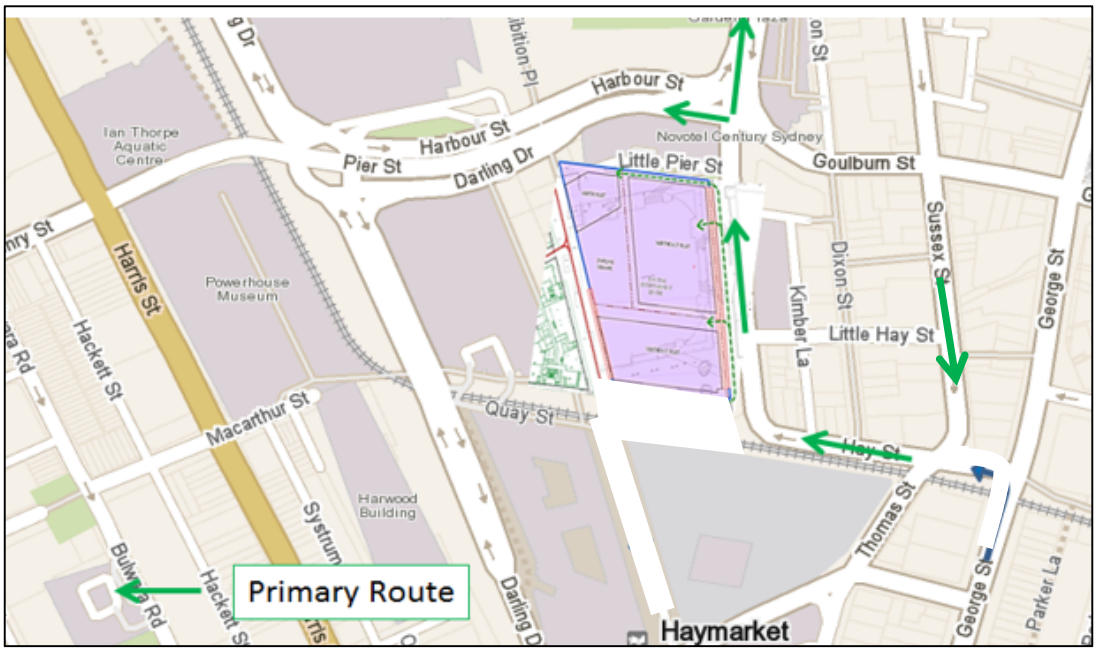


Figure 6 Wider Precinct Traffic Management Plan

Traffic movements and vehicles will conform to current Roads and Maritime (RMS) regulations including legal weight limits, only on approved roadways, with loads secured and covered.

All vehicles accessing the site will conform to the “Traffic controls at work sites” manual, and Australian Standard 1742 – Traffic control, and only certified traffic controllers shall be used to direct vehicles outside of the construction boundaries. The main access for construction deliveries shall be the entry and exit gates to the SE site as detailed in Section 10.2 and shown in Figure 7, Figure 8 and Figure 9. These points may need to be relocated during the course of the works to facilitate construction activities and will be controlled to ensure safe movement of vehicles and pedestrians.

These gates will be activated as the project progress through its various stages Demolition, Structure, Facade & Completion. As detailed these gates are outside the pedestrian routes so that the risk to the public is minimised. The existing pedestrian footpath, along Darling Drive east side, shall be redirected into the existing public domain area, to the north and south of the development.

If a vehicle gate is to be a major access point, it shall be manned so that there is no unauthorised access. At all other times they will be locked and monitored. All vehicle movements will be controlled through a vehicle permit system and notification procedure.

On site construction access routes will be established within the construction boundaries with hoists transporting personnel and materials within each building.

The truck movements anticipated will be spread evenly throughout the construction programme. Usually the bulk truck movements would be during the excavation phase, however, the adopted design involves minimal bulk excavation thereby reducing this heavy vehicle activity.

During the course of the development, it is anticipated that vehicle movements for trades such as Demolition, Civil, Piling, Detail Excavation, Structure, Façade, Internal Finishes and Public Domain works shall occur.

Based on the programme and volume of materials required, it is estimated that a maximum of 38 trucks per day or approximately 3-4 trucks per hour will access the site for the duration of the construction period. In such instances such as concrete pours, this volume will increase, but shall be controlled (as the preferred supply plant is within 1km of the development) to alleviate any congestion to the surrounding traffic network.

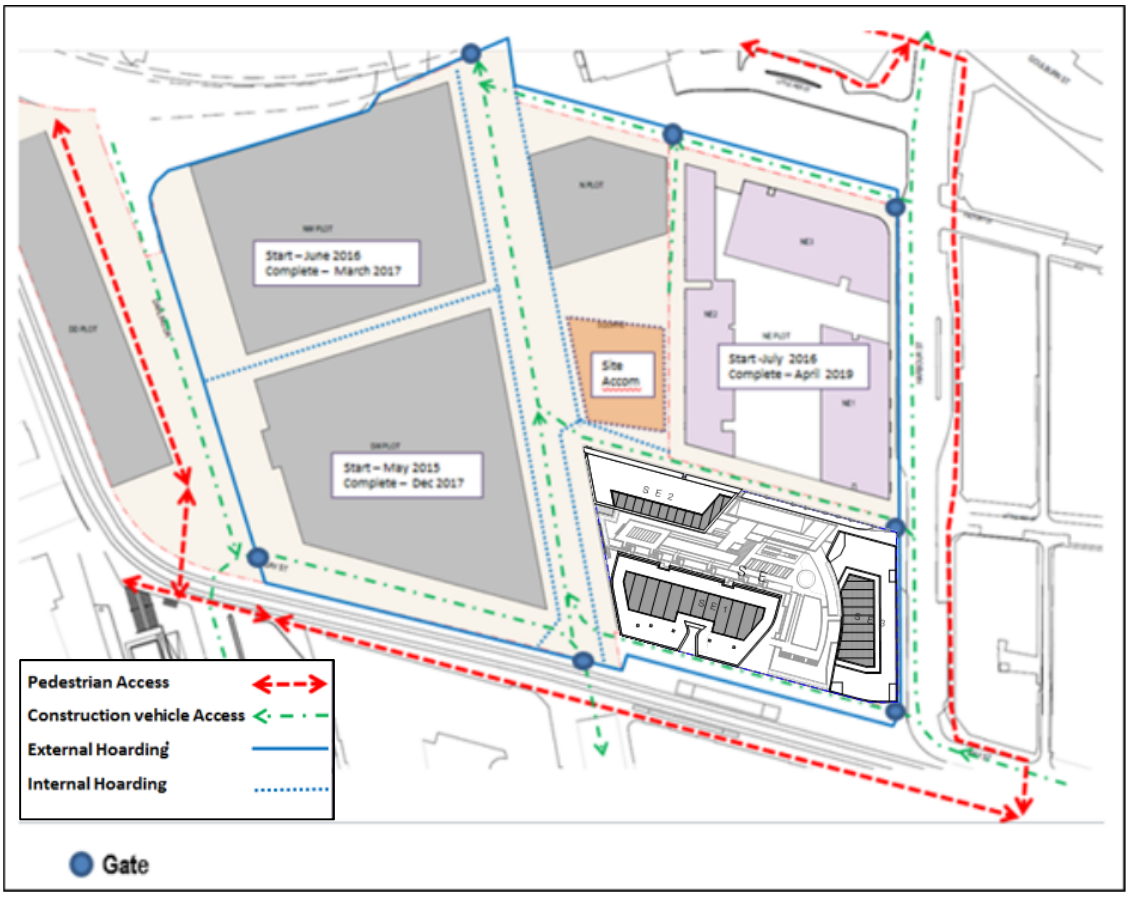


Figure 7 Construction Vehicle and Pedestrian Access during Sydney Entertainment Centre Demolition and Enabling Works (February 2017-July 2017)

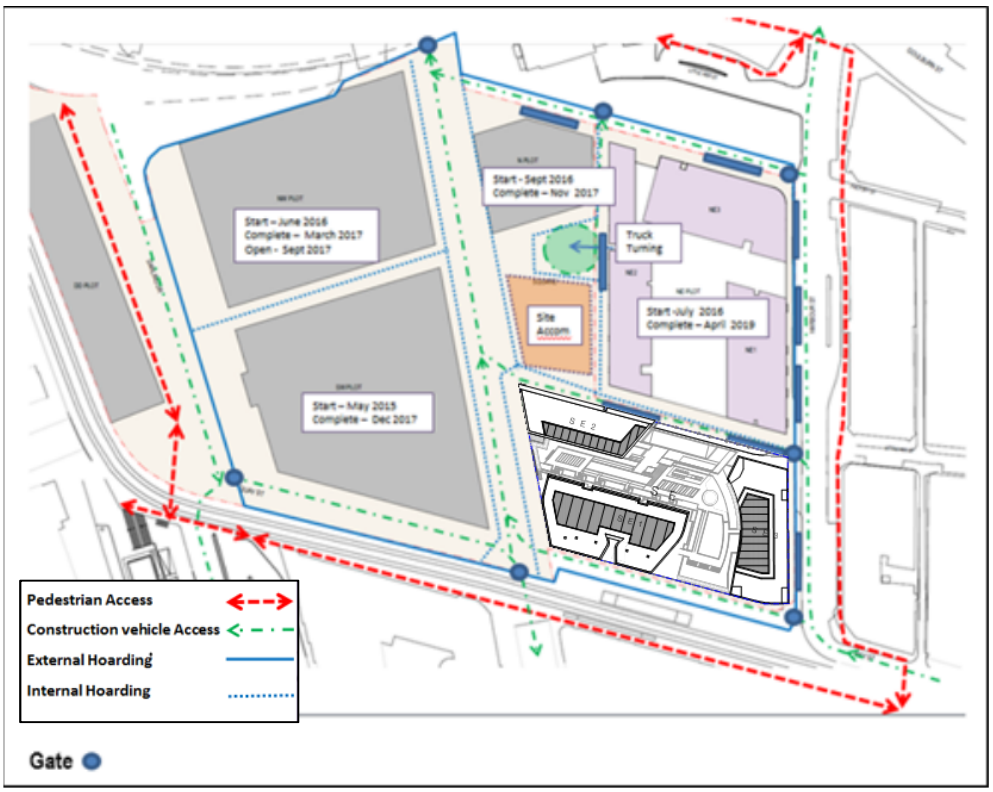


Figure 8 Construction Vehicle and Pedestrian Access during Sydney Entertainment Centre Demolition and Enabling Works (August 2017- February 2018)

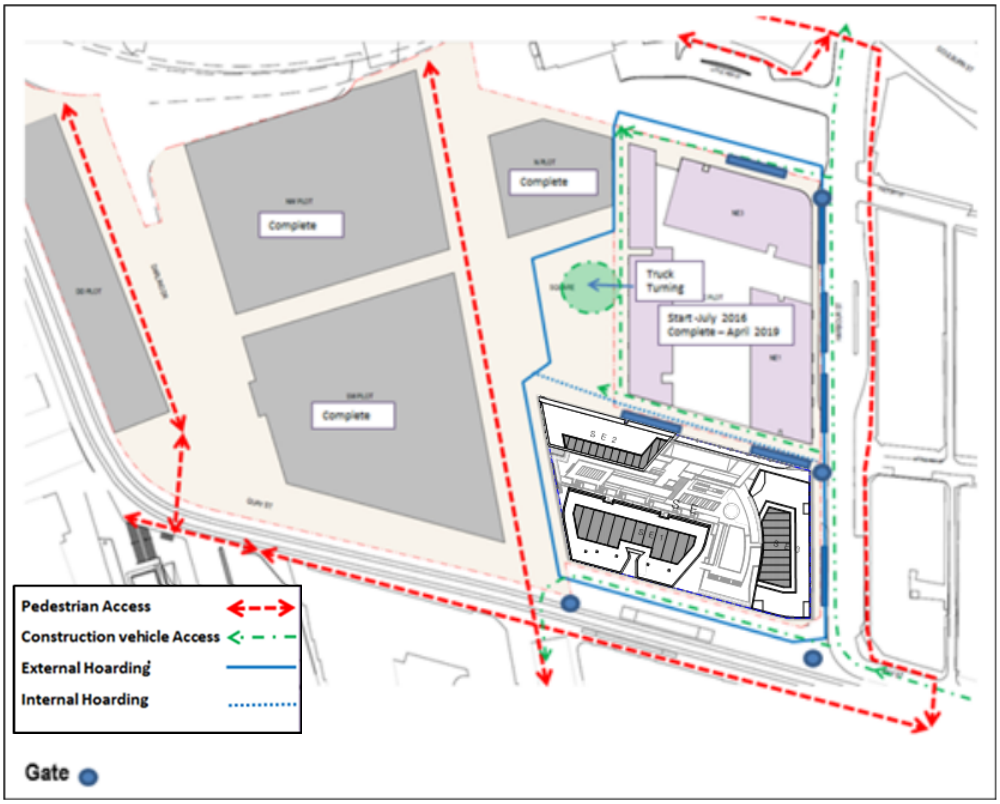


Figure 9 Construction Vehicle and Pedestrian Access during Sydney Entertainment Centre Demolition and Enabling Works (March 2018 - Completion)

10.6 PARKING

Onsite parking will not be allowed during construction. Measures will be implemented to encourage the use of good public transport systems already in place for construction staff and workers. This will be conveyed through all subcontract documentation and site inductions. Timetables shall be provided for all bus routes and the three closest railway stations serviced by bus routes.

10.7 PEDESTRIAN ACCESS

Pedestrian access will be provided as shown in Figure 7, Figure 8 and Figure 9.

Pedestrian access during construction will generally be adopting the following principles:

- Hoardings will be erected to prevent public entry into constructions areas;
- Public access along existing desire lines around construction areas will be maintained where possible;
- The southern portion of the Boulevard will be completed by December 2016 to connect with the Northern and Central Sector portion of the Boulevard; and
- Pedestrian access along Harbour Street will be controlled (and may need to be limited periodically) during demolition and services relocation works to ensure public safety.

10.8 TRAFFIC MANAGEMENT MEASURES

Vehicles that are frequent to site, such as concrete delivery vehicles, shall be inducted into the Traffic Management Plan to comply with their vehicle movements to and from the site.

Appropriate directional signage and traffic control will be provided to ensure vehicles enter and leave the site with minimal disturbance to other road users and so they are advised of any changes in road conditions.

Temporary road closures, single lane access and relocations during the construction period will be subject to coordination with the appropriate authorities. All traffic related issues and changes shall also be presented to Stakeholders as part of the consultation process. These will, wherever and whenever possible, be carried out in non-peak periods.

The traffic and pedestrian management plan outlined in the Construction Management Plan is generally aimed at mitigating any potential impacts that may be attributed to the construction works. Risks to the public and the construction crew would be minimised through the implementation of the construction management plans specifically prepared for the SICEEP construction works of the PPP and Darling Square. The Plan will be regularly updated to address any new outcomes identified through constant monitoring as the works progress.

10.9 CUMULATIVE TRAFFIC IMPACTS

The construction of the western portion of the Darling Square Precinct will be expected to be nearing completion by the time of commencement of construction of the SE plot. Adjacent to the SE plot will be the construction sites of the NW plot, SW plot and the NE plot. Each of the three sites will be accessed at different locations as follows:

- The NW plot will be accessed from the north along the new Zolner Circuit via the Darling Drive roundabout beneath Pier Street;

- The SW plot will be accessed by vehicles travelling north and south along Darling Drive turning into a loading area within the Hay Street corridor; and
- The NE plot will be accessed from the east on Harbour Street.

Construction works for other planned developments in the vicinity of the SICEEP site that are likely to coincide with the development have been considered Table 14 provides a list of known projects within and around the SICEEP site.

Table 14 Construction Projects in the vicinity of the SICEEP Site

Project Work	Start	Finish
SICEEP PDA South (Darling Square)	February 2014	Early 2019
SICEEP PDA North (ICC Hotel)	July 2014	August 2017
Barangaroo	September 2010	Circa 2020-2025
George Street light rail	Early 2015	Mid 2019
IMAX Darling Harbour	January 2017	End 2019

It is anticipated that access routes to construction works of other developments are likely to differ from that of SE plot. However, where the routes coincide the increase in heavy vehicles will be temporary only for the duration of the construction and will be managed through a Construction Traffic Management and Access Plan which was prepared prior to commencement of construction works and in consultation with the relevant stakeholders and affected parties.

This diversity of construction access points will largely mitigate any significant construction traffic impacts on Darling Drive and Harbour Street.

Analysis of the frequency and type of expected construction vehicles suggests:

- The distribution will alleviate potential for congestion at any single access point;
- Potential conflict points can be monitored and managed through the preparation of detailed construction traffic management plans;
- The specific plans will be regularly updated in accordance with any changes required to proposed route and movements as identified through constant monitoring as the works progress, and,
- Any possible impact would be marginal and temporary.

11 SUMMARY

11.1 CONCLUSIONS

This transport assessment of the South East plot was undertaken as a component of The Darling Square Precinct. The assessment focusses on access and the connectivity of the precinct with the external network for all modes of transport and cites the key features of the whole precinct that will contribute to this. Key elements of the proposal include:

Public Transport

- The location of the South East plot site is accessible by public transport (particularly the light rail) via the pedestrian linkages between the public transport nodes and the development.
- The design generally provides enhanced access to the public transport services through the creation of more direct travel paths through pedestrian boulevards, laneways and walkways.

Parking Provision

- Parking provision within South East plot complies with the maximum allowable set by the Concept Plan Approval and the maximum parking ratios proposed within SSDA2.

Road Network/Intersection Operational Performance

- The operational performances of the intersections relevant to the SE plot have been demonstrated to be satisfactory.
- The results of modelling indicate that the impact of the South East Plot as part of Darling Square development does not impose conditions on the intersections worse than what would have otherwise occurred through existing traffic.

Pedestrian

- The development will provide improved pedestrian linkages notably the main boulevard within the Public Realm linking the Goods Line to the south and Harbourside to the north. The main boulevard will be up to 20m wide and will have sufficient capacity to cater to peak pedestrian demand anticipated during events at the PPP. It also provides the main linkage between Darling Square, Darling Central and Bayside.
- The provision of pedestrian linkages via the shared zone and the signalised pedestrian crossing on Darling Drive will cater for pedestrian desire lines from the west of Darling Drive.

Cycleway

- Cycle connections are available to the SE plot via the existing cycleways on Darling Drive, the proposed new cycleway on the west side of Darling Drive (proposed as part of SSDA3), new east-west linkages and completion of the new boulevard running north-south through the precinct.

SEARs

- The requirements of the SEARs have been adequately assessed in the overall Transport and Traffic Impact Assessments for the SICEEP development submitted with SSDA1, SSDA2 (see Appendix A) & SSDA9.

11.2 RECOMMENDATIONS

Public Transport

- The access improvements being proposed as part of the development design will likely result in an improvement in public transport patronage. It is recommended that appropriate wayfinding and signage be installed along key access corridors to facilitate access.
- It is recommended that the taxi drop off zone be restricted for pick up and drop off only and be suitably signposted.

Road Network/Intersection Operational Performance

- The signals at the Darling Drive / Hay Street intersection will require minor layout adjustment to coordinate with site access.

Pedestrian

- It is recommended that the proposed pedestrian routes be enhanced through wayfinding and signage to facilitate connectivity in all directions.
- Interfacing with the improved external pedestrian network will enhance accessibility of Darling Square and further strengthen linkages with public transport.

Cycleway

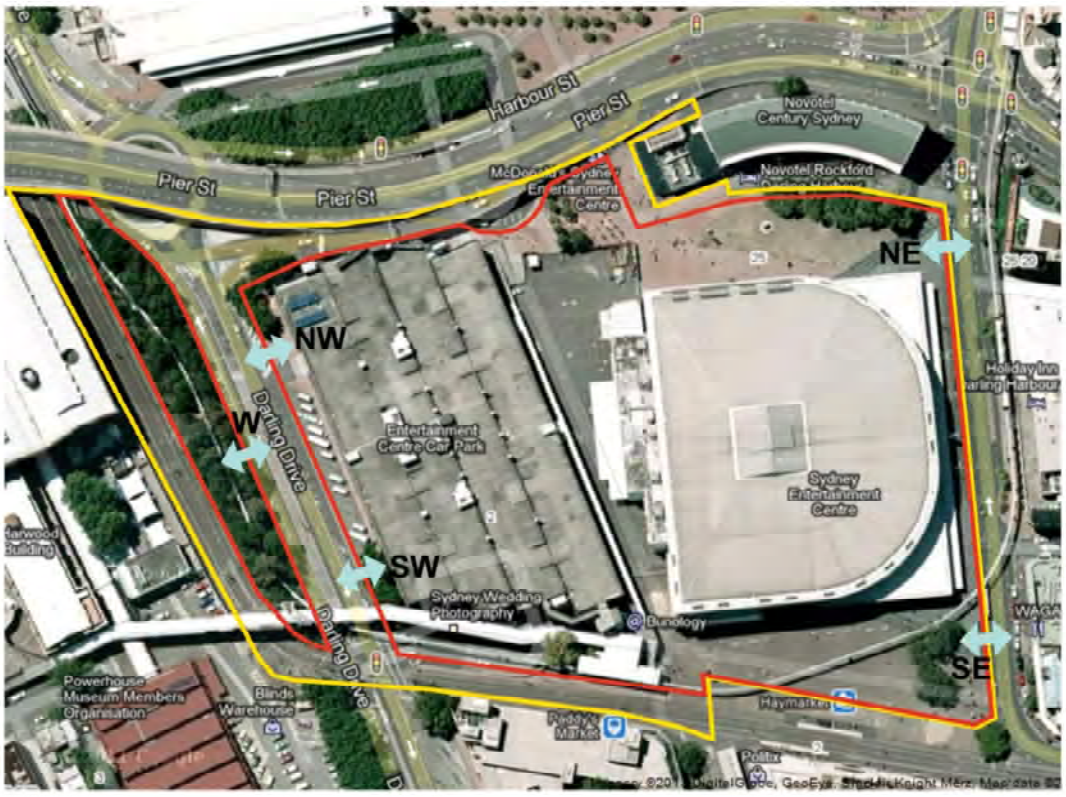
- As with the improved pedestrian amenity, the proposed augmentation of the city wide cycleway proposed along Darling Drive is supported.

APPENDIX A

SSDA2 TRANSPORT AND TRAFFIC IMPACT ASSESSMENT REPORT

SYDNEY INTERNATIONAL CONVENTION, EXHIBITION AND ENTERTAINMENT PRECINCT (SICEEP) – THE HAYMARKET PRECINCT

TRANSPORT AND TRAFFIC IMPACT ASSESSMENT (INCLUDING TMAP AND ROAD SAFETY ASSESSMENT)



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LEND LEASE PTY LTD

DARLING HARBOUR LIVE

Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP)

Transport and Traffic Impact Assessment (including TMAP and Road Safety Assessment) - The Haymarket

Author	Sally Manahan	
Checker	Mukit Rahman	
Approver	Michael Kurtz	

Report No

Date

This report has been prepared for Lend Lease Pty Ltd in accordance with the terms and conditions of appointment for Darling Harbour Live dated March 2013. Hyder Consulting Pty Ltd (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

CONTENTS

1 INTRODUCTION

This report supports a State Significant Development Application (SSD 5752-2012) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Application seeks approval for the establishment of building envelopes and design parameters for a new neighbourhood and a community hub (referred to as The Haymarket) as part of the Sydney International Convention, Exhibition and Entertainment Precinct SICEEP Project at Darling Harbour.

The project will develop The Haymarket into one of Sydney's most innovative residential and working districts. Through the delivery of the overall Project, Darling Harbour will also become home to Australia's largest convention and exhibition facilities, Sydney's largest red carpet entertainment venue, and a hotel complex of up to 900 rooms.

The SICEEP Project importantly forms a critical element of the NSW Government's aspiration to "make NSW number one again".

2 OVERVIEW OF PROPOSED DEVELOPMENT

The proposal relates to a staged development application and seeks to establish concept plan details for The Haymarket, located within the southern part of the SICEEP Site.

The Haymarket will include student housing, public car parking, a commercial office building, and four mixed use development blocks (retail/commercial/residential podium with residential towers above) centred around a new public square to be named Haymarket Square.

More specifically concept approval is sought for the following:

- Demolition of existing site improvements, including the existing Sydney entertainment Centre (SEC), Entertainment car park, and part of the pedestrian footbridge connected to the Entertainment car park and associated tree removal;
- North-west block – construction of a part public car park and part commercial/office building;
- North-east block – construction of a mixed use podium (comprising retail, commercial, above ground parking, and residential);
- South-east block - construction of a mixed use podium (comprising retail, commercial, above ground parking, and residential);
- South-west block - construction of a mixed use podium (comprising retail, commercial, above ground parking, and residential);
- North block – construction of a low rise mixed use building comprising retail, commercial and residential;
- Student housing – construction of two buildings providing for student accommodation;
- Public domain improvements including a new square, water features, new pedestrian streets and laneways, streetscape embellishments, and associated landscaping. (It is intended that a Stage 2 DA seeking approval for parts of the part of the public domain (The Boulevard and Haymarket Square) will be lodged with the first residential stage);
- Darling Drive realignment
- Remediation strategy; and

- Car parking rates.

2.1 BACKGROUND

The existing convention, exhibition and entertainment centre facilities at Darling Harbour were constructed in the 1980s and have provided an excellent service for Sydney and NSW.

The facilities however have limitations in their ability to service the contemporary exhibition and convention industry which has led to a loss in events being held in Sydney.

The NSW Government considers that a precinct-wide renewal and expansion is necessary and is accordingly committed to Sydney reclaiming its position on centre stage for hosting world-class events with the creation of the Sydney International Convention, Exhibition and Entertainment precinct.

Following an extensive and rigorous Expressions of Interest and Request for Proposals process, Darling Harbour Live (formerly known as 'Destination Sydney'- a consortium comprising AEG Ogden, Lend Lease, Capella Capital and Spotless) was announced by the NSW Government in December 2012 as the preferred proponent to transform Darling Harbour and create the new Sydney international convention, exhibition and entertainment precinct.

Key features of the Darling Harbour Live Preferred Master Plan include:

- Delivering world-class convention, exhibition and entertainment facilities, including:
  - Up to 40,000m^2 exhibition space;
  - Over 8,000m^2 of meeting rooms space, across 40 rooms;
  - Overall convention space capacity for more than 12,000 people;
  - A ballroom capable of accommodating 2,000 people; and
  - A premium, red-carpet entertainment facility with a capacity of 8,000 persons.
- Providing up to 900 hotel rooms in a hotel complex at the northern end of the precinct.
- A vibrant and authentic new neighbourhood at the southern end of the precinct, called 'The Haymarket', home to an IQ Hub focused on the creative industries and high-tech businesses, apartments, student accommodation, shops, cafes and restaurants.
- Renewed and upgraded public domain, including an outdoor event space for up to 25,000 people at an expanded Tumbalong Park.
- Improved pedestrian connections linking to the proposed Ultimo Pedestrian Network drawing people between Central, Chinatown and Cockle Bay Wharf as well as east-west between Ultimo/Pyrmont and the City.

2.2 SITE DESCRIPTION

The SICEEP Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

With an area of approximately 20 hectares, the SICEEP Site is generally bound by the Light Rail Line to the west, Harbourside shopping centre and Cockle Bay to the north, Darling Quarter, the Chinese Garden and Harbour Street to the east, and Hay Street to the south.

The SICEEP Site has been divided into three distinct redevelopment areas (from north to south) – Bayside, Darling Central and The Haymarket. The Application Site area relates to The Haymarket as shown in Figure 1.

Figure 1 SICEEP Site

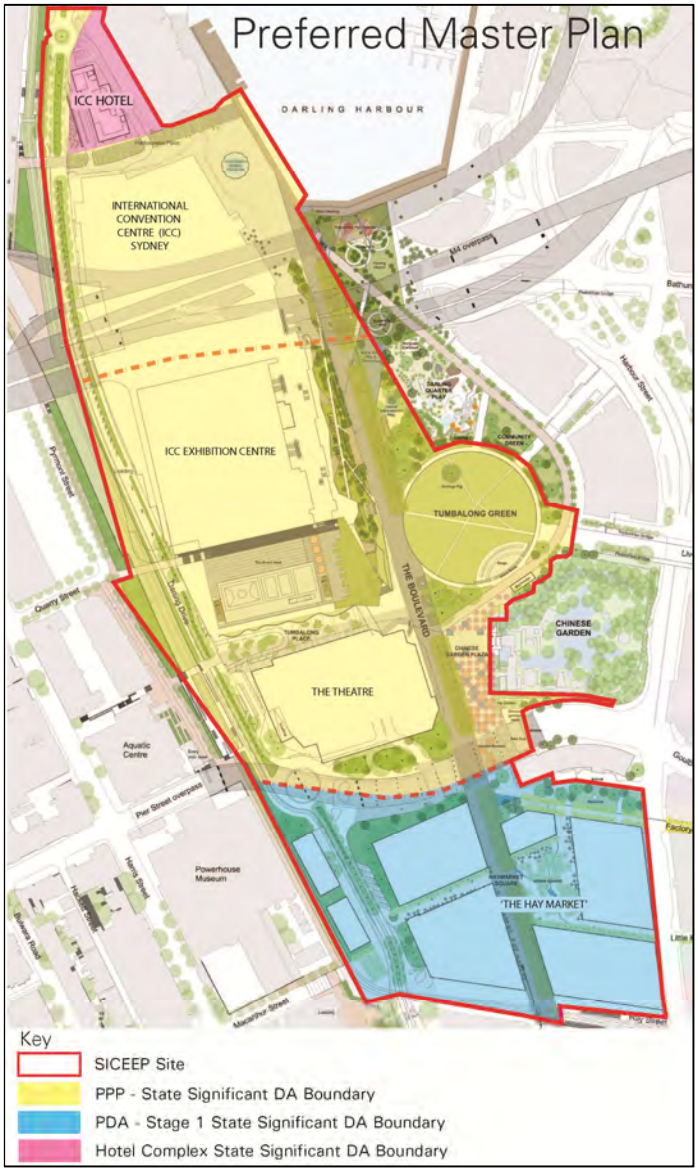
2.3 PLANNING APPROVALS STRATEGY

In response to separate contractual agreements with the NSW Government and staging requirements Lend Lease (Haymarket) Pty Ltd is proposing to submit a number of separate development applications for key elements of the overall Project.

This staged development application involves the establishment of building envelopes and design parameters for a new neighbourhood and a community hub (The Haymarket) within the southern part of the SICEEP Site. Detailed development applications will accordingly follow seeking approval for specific aspects of The Haymarket in accordance with the approved staged development application.

Separate development applications will be lodged for the PPP component of the SICEEP Project (comprising the convention centre, exhibition centre, entertainment facility and associated public domain upgrades) and Hotel complex.

Figure 2 Preferred Master Plan



2.4 SCOPE OF STUDY

An overall Transport and Traffic Impact Assessment (including TMAP and Road Safety Assessment) Study was undertaken for the Preferred Master Plan in order to assess the cumulative impacts of the proposal as a whole. A Transport and Traffic Assessment Report (Main Report) was prepared to support the development approval of the project and is attached as Appendix A. This report is being submitted to support the development approval of The Haymarket and has been prepared in conjunction with the Main Report.

This report is a compilation of the key sections from the Main Report that are relevant to The Haymarket. The Environmental Assessment Requirements issued by the Director General for development approval for the Preferred Master Plan and Specific Requirements for the individual SSDAs for the SICEEP (SSD 5752-2012) were issued on 21 January 2013. The main report addresses the general requirements for the overall project relating to Transport and Accessibility, as outlined in Section 8 of the DGRs.

Section 8 and 16.2 of the DGRs require the following:

- Address the impact of traffic and pedestrian volumes on surrounding road network including intersections using appropriate traffic modelling analysis based on the worst cumulative traffic impacts including a sensitivity analysis;
- Provide details of any upgrading or road improvement works required to accommodate the proposed development;
- Address any impacts on the Light Rail corridor and Western Distributor viaducts;
- Justify the level of car parking provided on the site;
- Provide details of measures to encourage sustainable transport measures, including end of trip cyclist facilities, pedestrian and cycle connections and travel plans;
- Address the impacts from construction traffic to the surrounding area and include the cumulative impact of construction activities from other sites in the locality;
- Provide details of the parking provision and arrangements during the demolition/construction period;
- Provide details of the pedestrian and cyclist connections to the surrounding area including west to Ultimo and east to the Central Business District;
- Address road safety at key intersections and locations subject to heavy vehicle movements and high pedestrian activity; and,
- Address traffic management during construction including cumulative impact from surrounding development sites and details of vehicle routes, numbers of trucks, hours of operation, access arrangements, traffic control measures, crane locations and swing path of cranes.

In addition to the General Requirements, a list of Specific Requirements for each of the individual SSDAs were provided. Issues to be considered for SSDA 2 – The Haymarket precinct (Concept) did not identify any issue under Transport and Accessibility.

2.5 STUDY OBJECTIVES

This study has been prepared in accordance with NSW Department of Transport's *Draft Interim Guidelines on TMAPs* and the RMS *Guide to Traffic Generating Developments*. The objectives of this study are to:

- Meet the DGRs
- Manage the transport impacts of the SICEEP development (The Haymarket)
- Help reduce reliance on private car use
- Promote and maximise the use of sustainable modes of transport, i.e. public transport, walking and cycling.

2.6 PREVIOUS STUDIES

This assessment was undertaken on the basis of data and information collected at the time of preparation of the report and supplemented by traffic data and information contained in the following reports:

- Traffic and Transport Conditions Report, Darling Harbour South Master Plan, Sydney Harbour Foreshore Authority, (Halcrow), November 2010.
- Urban Design Report – Darling Harbour South Master Plan, Johnson Pilton Walker, Sydney Harbour Foreshore Authority, December 2010.
- Ultimo Pedestrian Network (UPN) Stage 2 Central Station to Darling Harbour Pedestrian Link, SHFA (Aspects Studios with Choi Ropiha Fighera).

In addition, INSW provided two reports that covered the preliminary traffic analysis of baseline conditions of the SICEEP including the baseline traffic model developed in AIMSUN:

- Existing Traffic and Transport Conditions Report, Sydney International Convention, Exhibition and Entertainment Precinct, Infrastructure New South Wales (Mott MacDonald), May 2012.
- Traffic Management and Accessibility Plan, Sydney International Convention, Exhibition and Entertainment Precinct, Infrastructure New South Wales (Mott Macdonald), August 2012

The above reports formed the basis for the network model and is attached in Appendix A

2.7 REPORT STRUCTURE

This report is structured to provide a full assessment of the transport accessibility issues relating to the Preferred Master Plan. This report is laid out in the following order:

- Section 1 provides an introduction to the study;
- Section 2 provides an overview of the project, background information and the study objectives;
- Section 3 details the strategic context within which the assessment has taken place. This section provides a summary of strategies and priorities noted from relevant state, regional, local and other documents;
- Section 4 establishes the existing transport context in the surrounding area. The chapter also provides an overview of public transport, walk and cycle provisions;
- Section 5 presents the modelling approach and methodology to assess the road network impacts of the proposed development;
- Section 6 provides a more detailed overview of the Haymarket concept plan in terms of the development component, access arrangement etc.;
- Section 7 documents the impact assessment;

- Section 8 provides a summary of crash statistics collected by the RMS and discusses road safety issues associated with Darling Drive and Harbour Street corridors;
- Section 9 outlines the construction impacts and the draft construction traffic management plan; and,
- Section 10 provides the conclusions and recommendations of this study.

3 STRATEGIC CONTEXT

3.1 INTRODUCTION

NSW Government strategies and policies have been continuously articulated in policy documents. Key themes in these policies have been the need to reduce car dependency, increase the attractiveness and usage of sustainable transport modes, reduce the growth in vehicle kilometres travelled and provide an urban form which supports public transport provision.

The documents reviewed contain the strategic context relevant to the local planning and development of the SICEEP site. Details of each document have been provided in the Main Report and are noted below in the context of development directions relevant to the Southern Haymarket Precinct.

3.2 STATE AND REGIONAL STRATEGIC POLICIES

The following documents were reviewed:

- NSW 2021
- Metropolitan Plan for Sydney 2036
- NSW Long Term Master Plan
- The Sydney City Draft Sub-Regional Strategy
- Planning Guidelines for Walking and Cycling
- NSW Bike Plan 2010
- Integrating Land use and transport Policy Package

The strategic policies embodied in these documents provide the framework for the overall development objectives for the SICEEP noting key priorities in land use and transport to support economic growth and guide strategic directions of planning outcomes necessary to ensure sustainable environments.

3.3 LOCAL PLANNING CONTEXT

- Sustainable Sydney 2030
- Cycle Strategy and Action Plan
- Infrastructure NSW SICEEP Urban Design and Public Realm Guidelines
- City of Sydney Chinatown Public Domain Plan
- Ultimo Pedestrian Network

The local planning documents outline the planning principles to guide the development of the City of Sydney. The documents define specific goals and objectives that should be met while planning of infrastructure for transport and accessibility.

4 EXISTING TRANSPORT CONDITIONS

4.1 ROAD NETWORK PERFORMANCE

An assessment of existing network capacity has been undertaken to identify key issues with regard to network deficiencies at key roads and intersections.

4.1.1 TRAFFIC SURVEY DATA

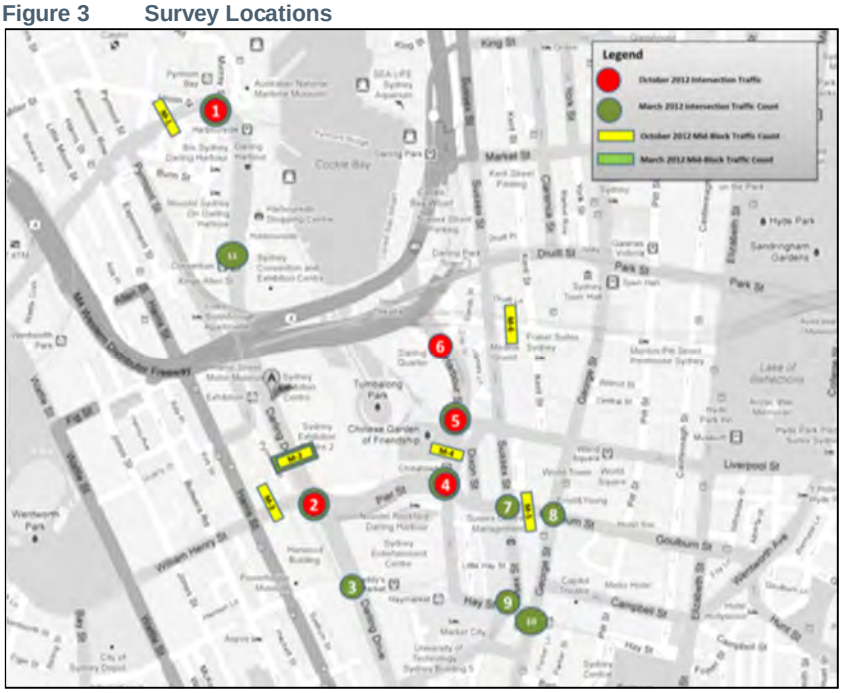
INSW provided intersection turning movement counts for eight intersections and midblock automatic tube counts for 7 locations within the study area. The intersection classified turning movement counts were undertaken for three hours in the AM peak (7-10am) and three hours in the PM peak (4-7pm) on a Thursday (25 October 2012) and on a Saturday (27 October 2012). The midblock automatic tube counts were collected for three days from Thursday to Saturday (25-27 October 2012).

Traffic surveys were also undertaken as part of the Transport Study commissioned by INSW to Mott MacDonald. The traffic survey data was also provided to Hyder for reference in this study. The surveys covered turning movement counts at 14 intersections and were undertaken for two hours (4:30-6:30 p.m.) on a Friday (23 March 2012). The midblock automatic tube counts were collected at two locations for a period of seven (7) days (16-23 March 2012).

Combining both data sets, a total of nineteen (19) intersections had survey data, eight (8) of which had both weekday and weekend data while eleven (11) sites had only weekday data. Both data sets were utilised to inform the analysis for model development, calibration and validation.

Figure 3 shows locations of the selected surveyed intersections and midblock locations included in the modelling.

Figure 3 Survey Locations



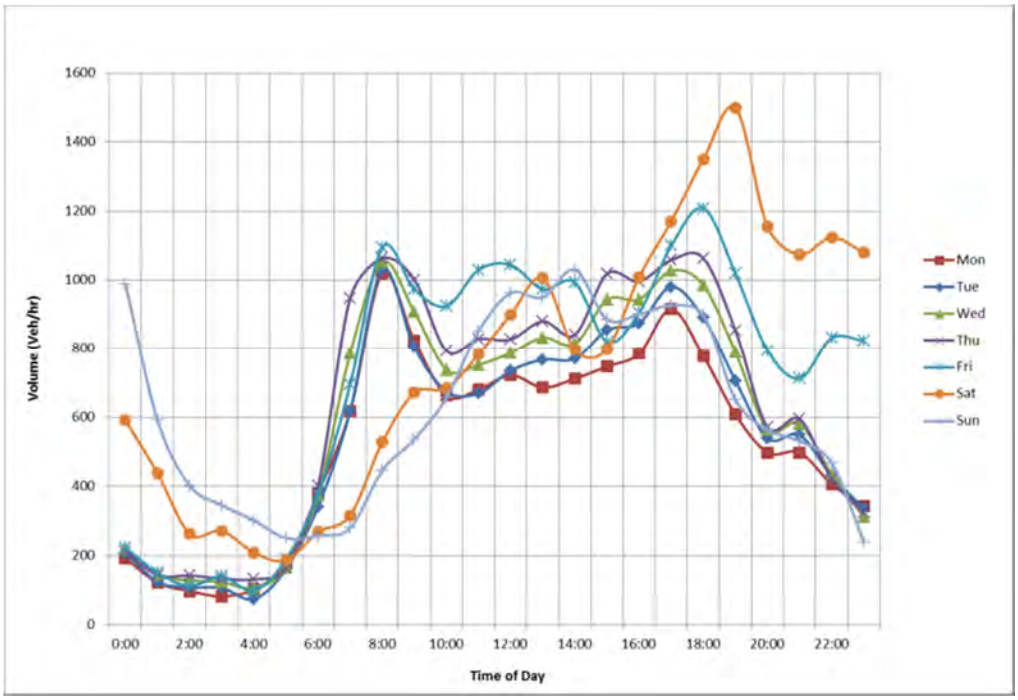
4.1.2 TRAFFIC VOLUME TRENDS

In the study document prepared by Mott MacDonald for INSW it was reported that Friday evening (5.30pm to 6.30pm) manifests the highest peak for traffic volume at the study area compared to other weekday traffic volume (based on midblock 24hours data collection). The profile shown in Figure 4 below represents traffic volume trends observed on Darling Drive.

Insights from the data include:

- Monday to Thursday follow similar trends and volume profiles throughout the day;
- Morning peak hour is generally between 8am to 9am and evening peak hour is generally between 5pm to 6pm on a weekday;
- Friday shows a different trend with the traffic increasing till 9am and remaining relatively constant until 6pm after then traffic volume decreases but then starts again to increase at 9 pm and reaches a daily high at midnight; and
- Saturday evening peak is 38% higher than the average weekly peak. Different traffic pattern indicates the use of the network by regular commuter traffic for most of the week and the shift to “entertainment-related” traffic for both Friday and Saturday evenings.

Figure 4 Seven days Traffic Volume Counts (March 2012), Darling Drive



Mid-block counts conducted in November 2012 showed similar trends on Pyrmont Road and Darling Drive with Saturday count manifesting the highest PM peak period. Traffic volumes observed on Pier Street, Harbour Street, Goulburn Street and Bathurst Street showed weekday (Thursday and Friday) traffic to be generally higher than weekend (Saturday) traffic.

4.1.3 OBSERVED PEAK PERIODS AT INTERSECTIONS

Table 4-1 summarises the highest peak hour observed at key intersections in the vicinity of The Haymarket Precinct. The hour between 17:00 PM and 18:00 PM shows predominant weekday peak. The weekend PM peak spreads between 18:00 PM and 19:00 PM.

Table 4-1 Observed AM and PM Peak Periods at selected key Intersections

Intersection	Control Type	Weekday PM Peak	Weekend PM Peak
Darling Drive/Pier Street	Roundabout	17:30-18:30	17:45-18:45
Darling Drive/Hay Street	Signal	17:00-18:00	
Harbour Street/Liverpool	Signal	17:00-18:00	18:00-19:00
Harbour Street/Goulburn	Signal	17:30-18:30	18:00-19:00

4.2 PUBLIC TRANSPORT SERVICES

The site is accessible via public transport services generally located on the eastern side of the Darling Harbour precinct and consisting of buses, light rail, ferry services and heavy rail.

4.2.1 CITYRAIL SUBURBAN RAIL SERVICES

The Haymarket Precinct site is accessible via the suburban rail stations in the CBD with walking distances from approximately 700-800 metres from the train station at Town Hall and Central Station, respectively. Town Hall Station is approximately 10-12 minutes walking distance to The Haymarket Precinct. via Bathurst Street and Harbour Street. Central Station is a also 10-12 minutes' walk via Ultimo Road/George Street. Both rail stations provide connections to the suburban rail network with Central Station also servicing interurban and inter regional rail services and coaches. Most train services do not operate between midnight and 4 AM but an alternative NightRide bus service is available between these hours on most Sydney suburban lines.

4.2.2 LIGHT RAIL

The Metro Light Rail provides a direct connection from Central Station/CBD on the eastern side with the inner West suburbs through Darling Harbour South. The Metro Light Rail transport system traverses east west from Central Station along Hay Street via Capitol Square, Paddy's Market, then travels north parallel to Darling Drive with stops at ICC Exhibition Centre, Convention Centre, up to Pyrmont Bay, then Star Casino then onwards to Lilyfield. The light rail operates from 6am to 11pm daily between Central Station and Lilyfield with a service frequency of 10-15 minutes and 24 hours daily between Central Station and Star Casino with night service at 30 minute intervals. Extended hours are also observed on the Central Station to Lilyfield route during Fridays and Saturdays.

Figure 5 Sydney Light Rail Service Coverage

Source: ***www.metrotransport.com.au***

4.2.3 EXISTING BUS SERVICES

Bus services in the Sydney CBD are provided by Sydney Buses. There are no bus routes or bus stops in the immediate vicinity adjoining the ICC Exhibition Centre or along Darling Drive. The closest bus stop is located at the Maritime Museum some 5 minutes walking distance from the Site and is being serviced by bus route 443 and bus route 448.

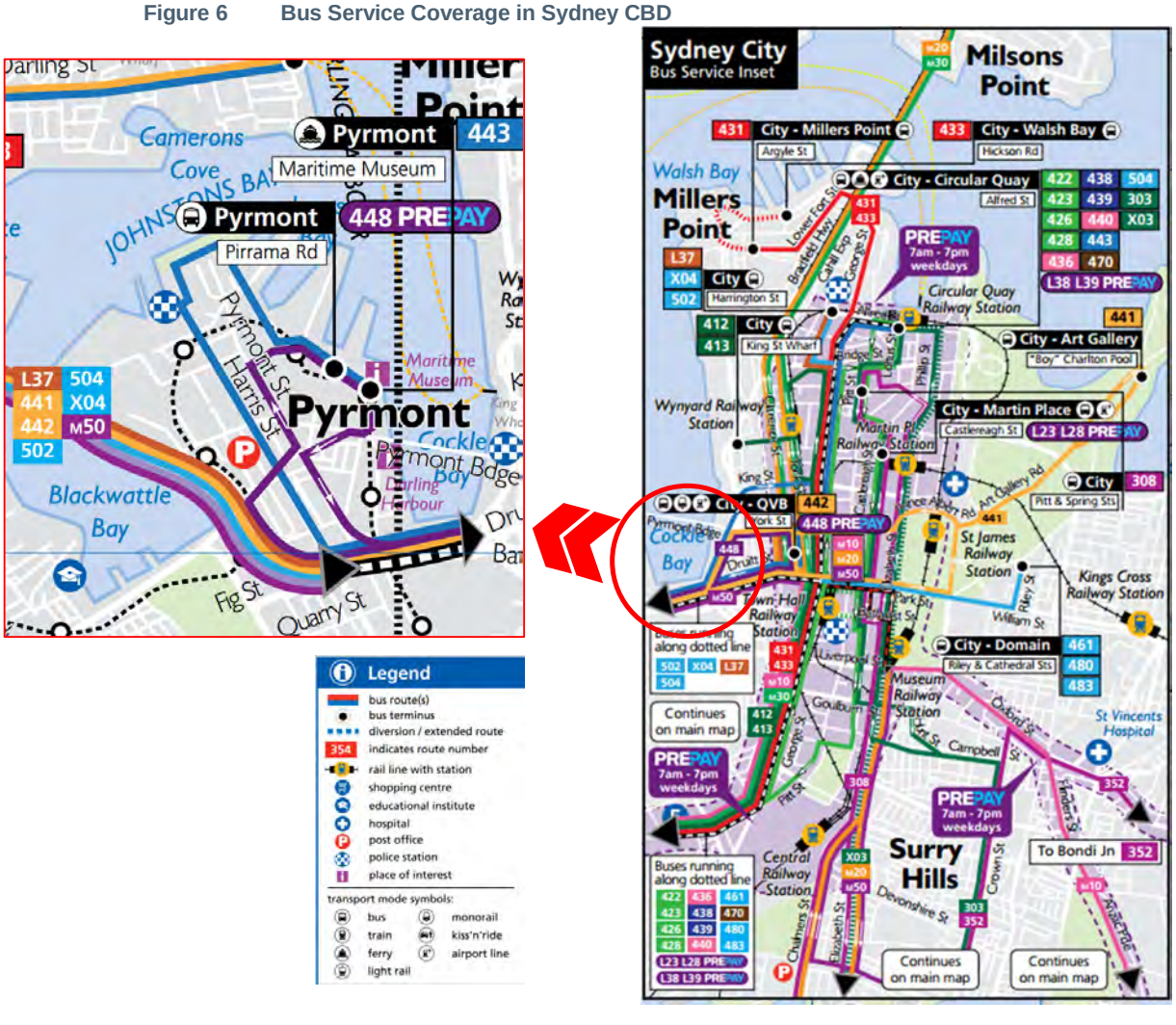
In proximity to the site, a large number of routes operating in the CBD have stops along George Street, with the majority stopping at Town Hall/QVB approximately some 10 minutes walking distance from the SICEEP.

A total of eight (8) bus routes travelling along George Street can service the transport demand for the SICEEP. These routes including bus routes 443 and 448 will be assessed in terms of its level of service based on its current operating characteristics.

The routes consist of daily full time service, Monday to Friday peak hour service, pre-pay service only and a combination of pre-pay and pay-on-board service.

The routes are shown in Figure 6. In addition to the above routes, Sydney Buses operates Route 555 which is a free shuttle bus service in the CBD. The Sydney CBD shuttle bus runs every 10 minutes in both directions on a loop from Central Station to Circular Quay via Elizabeth and George Streets. On weekdays, the shuttle bus operates from 9:30am to 3:30pm with a late finish of 9pm on Thursday evenings and on weekends from 9:30am to 6:00pm. Commuters can board these high frequency buses from any bus stop marked with the green shuttle logo. Each bus is an accessible bus that can be used by people in wheelchairs or with other accessibility requirements, and parents or carers with prams.

Figure 6 Bus Service Coverage in Sydney CBD



Source: www.151300.com.au

4.2.4 FERRY SERVICES

Sydney Ferries operates ferry services between Circular Quay and Darling Harbour via Milson Point, McMahons Point, Balmain East and stops at Sydney Aquarium and Pyrmont Bay. Both stops are some 5-10 minutes walking distance to the Convention Centre.