



# Proposed commercial building Darling Walk

## Harbour Street, Sydney

Pre DA BCA Review  
April 2008

### Compiled for

Bovis Lend Lease Pty Ltd  
Level 4 - The Bond  
30 Hickson Road  
MILLERS POINT NSW 2000

Contact: Mr Kim Goh

### Compiled by

Philip Chun and Associates  
Suite 4, Level 4  
44 Hampden Road,  
ARTARMON NSW 2064

Contact: Mr Robert Marinelli

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BUILDING REGULATION AND  
FIRE SAFETY CONSULTANTS

PHILIP CHUN AND  
ASSOCIATES PTY. LTD.  
T/A PHILIP CHUN AND  
ASSOCIATES (AUST)

ACN 007 401 649  
A.B.N. 64 597 649 811

SUITE 4, LEVEL 4  
44 HAMPDEN ROAD  
ARTARMON 2064

PHONE: (02) 9412 2322  
FAX: (02) 9412 2433

[www.philipchun.com.au](http://www.philipchun.com.au)

DIRECTORS:  
PHILIP CHUN  
GREG du CHATEAU  
ROBERT MARINELLI  
SHANE LEONARD  
PETER CZERKASKI  
MICHAEL MORAN  
RICHARD WELLS

ASSOCIATES:  
PHILIP SMILLIE  
VIVIANA FLOREANCIG  
NICK SNART  
CHRISTINA CHAI

OFFICES IN:  
MELBOURNE  
SYDNEY  
BRISBANE

# 1.0 Introduction and Documentation

## Introduction

This report contains a design philosophy review concerning the capability of the design to meet Building Code of Australia requirements. The review has found that the fundamental design is capable of meeting the requirements of BCA2008 with the inclusion of fire engineering.

At the request of Bovis Lend Lease Pty Ltd, this report contains details of compliance with respect to the Building Code of Australia 2008 for the proposed construction of a new twin tower building complex. The proposed building will include four levels of basement including therein carparking dock and plant, a mixed use ground floor level, eight levels of office accommodation and roof top plant room. A void at the buildings ground floor level connect the ground floor level with the first floor level. There is proposed also an atrium in each tower connecting level 1 through to level 8. There will also be a single level of rooftop plant. The location of the building will be at on the current Segaworld site in Harbour Street.

We have reviewed the submitted documentation (provided to date) for compliance with the deemed-to-satisfy provisions of the Building Code of Australia. Where compliance with the deemed to satisfy provisions is not possible a schedule of alternate solutions will be provided as discussed and requested by the architects and designers. A separate fire engineering consulting company will be providing advice on the performance assessment of the departures from the deemed to satisfy provisions.

We have made every attempt to cover the main issues under Parts C, D, E and F of the Building Code of Australia. Areas of the design are still being refined so that resolution will be possible prior to the issue of the Construction Certificate for the works.

Methodology is principally inspection of the available documentation for the building at this point in time prepared by FJMT and Lend Lease Design.

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## Documentation available and assessed

The Design Development scheme assessed comprises of the following design drawings provided electronically as per the attached drawing schedule.

### Drawings

DC004, DC0005, DC006 ,DC007, DC007A, DC009, DC010, DC011, DC011B, DC012, DC014A, DC014B.

## 2.0 Use and Class of Buildings

The development comprises of two commercial office towers constructed over a basement carpark.

Class and use of the various levels of the building are as follows:-

### Basement

Level	Proposed Use	Building Code of Australia Class
Basement level 4	Plant / Carpark	Class 7a ancillary
Basement level 3	Plant / Carpark	Class 7a ancillary
Basement level 2	Plant, Carparking, Loading Docks	Class 7a ancillary
Basement level 1	Carparking,	Class 7a

### North Building

Level	Proposed Use	Building Code of Australia Class
Ground	Loading dock entry, Fire control room, Plant, Retail, Office, Entrance and Lift Lobby, Theatre / Place of Public Entertainment	Class 5, Class 6, Class 9b
Levels 1 to 8	Office	Class 5
Level 9	Plant room	Class 5

### South Building

Level	Proposed Use	Building Code of Australia Class
Ground	Retail, Office Entrance and Lift Lobby Plant	Class 5, Class 6
Levels 1 to 8	Office	Class 5
Level 9	Plant room	Class 5

The building will be documented so that it will comply with the requirements of Type A construction. The required fire ratings are specified in the following report.

### 3.0 Construction and fire resistance ratings

The building is to be constructed of structural reinforced concrete and steel construction with an external facade of lightweight cladding masonry and glazing. The building has been designed to be greater than 25 metres in effective height however less than 50 metres.

The fundament concept of fire rating for the building will be as per the following table:

Building Component	Class 7a, 5 & 9b	Class 6
External walls (load-bearing)	120/60/30	180/120/90
Fire walls	120/120/120	180/180/180
Shaft walls (lift and stairs)	120/120/120	180/180/180
Service shafts	120/90/90	180/120/120
Between sole occupancy units (load-bearing)	120/-/-	180/-/-
Between sole occupancy units (non-load bearing)	-/-/-	-/-/-
Load-bearing columns, internal walls, internal beams and trusses	120/-/-	180/-/-
Floors	120/120/120	180/180/180

Different occupancy classes are to be fire separated via a firewall or alternatively both adjoining components may adopt the higher FRL requirements. This may apply to the ground floor level and the basement levels of the building where the uses are shared.

Load-bearing internal walls are to be constructed of concrete or masonry.

The roof covering is to be non-combustible construction where the building is provided with sprinkler protection.

The following services are to be separated from the remainder of the building via a 120/120/120 FRL:-

- Switchroom
- Lift motor rooms
- Boilers
- Essential services generator systems

The electrical substation located on the ground floor level of the northern tower must be separated from any other part of the building by construction having an FRL of not less than -/180/180 and have self closing fire doors with a fire rating of -/180/30 (this will be an Energy Australia requirement rather than a BCA requirement).

Spandrel separation under C2.6 does not apply to sprinkler protected buildings.

### Fire compartment areas and volumes

The maximum area and maximum volume of fire compartments allowed as specified in Part C2.2 of the BCA for Type A construction is 5,000m<sup>2</sup> and 30,000m<sup>3</sup> respectively for the class 6 parts of the building and 8,000m<sup>2</sup> and 48,000m<sup>3</sup> respectively for class 5 and 9b parts.

The basement levels have in excess of 40 cars as well as areas dedicated for cycle parking, service vehicles, loading docks and plant areas. As the building is greater than 25 metres the building will require sprinkler protection in any case. A sprinklered carpark has no compartment size limit.

The maximum floor area for the commercial floor fire compartments will be exceeded to the atrium areas of the buildings as the floors will be connected by the atria through the building. The proposed fire compartment areas will vary from the requirements specified in Part C2.2 of the BCA. This will be justified through fire engineering.

## Connection of floors

In parts of the buildings where the atrium connects all levels, an alternate solution will be required as the buildings do not have the lowest level connecting the ground floor. There are anticipated also other variations from the atrium provisions including deletion of bounding walls to the buildings and also reduction of the fan sizes to the top of the atrium.

## Protection of Openings

The complex is bounded by public roads on 2 sides with Harbour Street to the Northeast and the Western Distributer to the North. On the South side there is the extension of Liverpool Street and to the Southwest there is Tumbalong Park. The buildings are set back at least 6 metres from the development boundary where they face the park and Liverpool street and are also set back on the boundary to the expressway. There is no exposure to the Harbour Street side as it is not deemed a fire source feature.

Areas that may need protection of openings will be driven by the point of discharge of the fire stairs and also where windows may be exposed to other fire compartments.

## 4.0 Access and Egress

### Principles

The buildings' egress system has been assessed and designed to ensure compliance with the following principles:

- Every floor of the building is provided with at least two exits as there are levels over 25 metres and the building contains an atrium.
- The maximum distance of travel to an exit to floors is to be 40 metres, and to a point of choice is to be 20 metres.
- The distance between alternate exits is not to exceed 60 metres.
- The distance between alternate exits is to be not less than 9 metres.
- The construction and discharge of stairs, landings, thresholds, balustrades and handrails will need to meet the requirements of the BCA.
- Fire corridors provided for egress will achieve the same fire rating as that provided to their associated fire-isolated stairs.
- All paths of travel are to be a minimum of 1000mm in clear width.
- All fire stair doors require re-entry mechanisms operating on a fire trip (D2.22) and an intercom system if the doors are to be secured from inside the stair.
- Widths of exits and corridors must be sufficient to provide safe passage for occupant egress – each level needs a minimum of 4.5 metres of aggregate egress.

Variations from the above will require that justification will be provided by a fire engineer.

### Disabled access considerations

- Access for persons with disabilities must meet the requirements of AS 1428.1.
- Access for persons with disabilities will be needed to the entry door to all tenancies and floors i.e. 800mm clear. All doors need to be either 870mm or 920mm leaf so as to open at least 800mm clear;
- Lifts – All lifts to have disabled access features in accordance with E3.6. At least two emergency lifts should be installed in accordance with E3.4 and at least one of these lifts should be provided with a stretcher facility.
- Braille and tactile signage complying with AS 1428.1 is required to identify each sanitary facility for persons with disabilities.

## 5.0 Fire Systems

The following is a status of the services required and to be provided to the building.

### Fire services

**Fire Hydrants** Fire hydrants are to be provided throughout to AS 2419. A ring main will be required to each hydrant riser.

All internal pumphouses located within a building shall have a door opening to a road or open space, or a door opening to fire-isolated passage or stair which leads to a road or open space and except where the building is sprinklered in accordance with AS 2118.1, enclosing walls with an FRL not less than that prescribed by the Building Code of Australia for a fire wall applicable to the adjoining classification.

Hydrant booster location within 10 metres of a building is to be protected by a 90 minute fire rated wall extended 2 metres either side of booster and 3 metres above ground level.

The location of the boosters needs to be approved by the NSW Fire Brigade.

Location of the fire hydrants to the building will need to be assessed but should be located within the fire isolated stairs of the building.

**Fire Hose-Reels** Fire hose-reels should be arranged to provide for full coverage to the building in accordance with AS 2444.

Fire hose-reels are to be located within 4 metres of an exit or a fire hydrant.

**Sprinklers** A sprinkler system complying with AS 2118.1 is to be provided. Ensure the control valves do not control an area greater than that permitted for each applicable occupancy class.

Location of the sprinkler valve room needs to be directly to the street or open space.

Special requirements need to be incorporated in the sprinkler design due to the atria in the buildings.

**Sprinklers - External Wall Wetting** Any openings within the prescribed distances in BCA for openings in different compartments, facing each other may be protected with external wall wetting sprinkler heads.

This also applies to openings where located within 6 metres of the external fire stair system if it has windows that are exposed.

Variations from the above will require that justification will be provided by a fire engineer.

## Fire Control Room

A Fire Control Room in a specialised room at ground floor level is to be provided in accordance with Specification E1.8. Any variations from Spec E1.8 to be approved by NSWFB. There is provision for the fire control room at the ground floor level of the northern tower, which is accessible however not directly off street level.

## Smoke hazard management

Fire isolated exits	Requirements
<p>A <b>fire isolated stairway</b> including any associated fire isolated passageway or fire isolated ramp serving –</p> <p>(i) any storey above an effective height of 25m; or</p> <p>(ii) more than 2 below ground storeys, not counted in the rise in storeys in accordance with C1.2,</p> <p>must be provided with an automatic air pressurisation system for fire isolated exits in accordance with AS/NZS 1668.1</p>	<ul style="list-style-type: none"> <li>The fire stairs will require an automatic air pressurisation system as they are serving parts of the floor over 25 metres</li> <li>The basement floor levels are more than two levels below the street and also need automatic air pressurisation system.</li> </ul>

Buildings more than 25m in effective height	Requirements
<p>In a-</p> <p>(b) <b>Class 5, 6, 7b, 8 or 9b building</b> or part of a building the building must be provided with a zone smoke control system in accordance with AS/NZS 1668.1; and</p>	<ul style="list-style-type: none"> <li>Needs a zone smoke control system in accordance with AS/NZS 1668.1 to all areas other than Class 6.</li> </ul>
<p>A <b>Class 7a building</b>, including a basement, provided with a mechanical ventilation system in accordance with AS 1668.2 must comply with Clause 5.5 of AS/NZS 1668.1 and—(a) fans with metal blades suitable for operation at normal temperature may be used; and (b) the electrical power and control cabling need not be fire rated.</p>	<ul style="list-style-type: none"> <li>Smoke detectors in accordance with Clause 4.10.1 shall be installed in the supply air system in accordance with Clause 4.10.5(b).</li> </ul>

Atria smoke hazard management	Requirements
<p>The building needs to comply with the requirements of specification G3.8</p>	<ul style="list-style-type: none"> <li>Needs an atrium smoke exhaust system</li> <li>The atrium perimeter needs bounding wall</li> <li>The building will need a smoke detection system to the floors and the atrium areas</li> <li>Sprinkler grade of water supply needs to be assessed</li> <li>Stand by power or generators may be required</li> </ul>

## Lift systems

A minimum of two emergency lifts will need to be provided to the building as the effective height is greater than 25 metres. The emergency lifts may be combined with the passenger lifts as the passenger lifts serve every storey.

The proposed lifts will require details to ensure compliance as to which ones are the designated Emergency Lifts. Two emergency lifts must serve every level of the building including the basement levels (that is two lifts to each level as a minimum that comply with the requirements for an

Emergency Lift). All lift cars must be provided with fire service controls in accordance with AS 1735.2.

All lifts must be accessible for people with disabilities and provided with the following:

- Fitted with car control buttons and handrails complying with AS 1735.12.
- Internal floor dimensions not less than 1400mm x 1100mm.
- Clear opening of the doorway to be not less than 900mm.
- Fitted with door opening sensory devices.

## Emergency Lighting, Exit Signs And Warning Systems

Exit and emergency lighting	A system of emergency lights and exit signage will be installed in the building to AS2293.
Sound systems and intercom systems for emergency purposes	A system complying with AS 1670.4 and AS 4428.4 is to be provided to the building.

## 6.0 Health and amenity issues

The following criteria detail the required sanitary facilities to be provided.

### Sanitary facilities

The populations for the building levels have been derived from the BCA where the acceptable area per person for offices is 10m<sup>2</sup>. The following table identifies the requirements for the building that will apply for the various uses.

Toilet numbers per office floor to the building are as follows

#### North Building

Facility	WC	Urinals	Basins	Factoring in the accessible facilities the fittings will cater for
Males	11	6	6	240 / 300 / 210 hence - 210 males per floor served
Females	15		6	225 / - / 210 - hence 210 females per floor served
Accessible	1		1	

#### South Building

Facility	WC	Urinals	Basins	Factoring in the accessible facilities the fittings will cater for
Males	11	6	7	240 / 300 / 240 hence - 240 males per floor served
Females	15		7	225 / - / 240 - hence 240 females per floor served
Accessible	1		1	

As per F2.2 (c), in calculating the number of sanitary facilities to be provided, a unisex sanitary facility required for people with disabilities, may be counted once for each sex.

#### Retail and other areas

It should be noted that separate facilities will be provided for the Theatre areas, retail areas on ground floor and the childcare areas to level 6.

There is an accessible facility at each level – fit out to comply with AS1428.1.

### Swing and operation of doors to the WC's

Doors to fully enclosed sanitary compartments to open outwards, or slide or have 1.2 metres clear space between door and closet plan or be readily removable from the outside of the sanitary compartment.

### Light and ventilation

Office buildings Natural ventilation in accordance with F4.6 or mechanical ventilation to AS 1668.2 is to be provided to the building.

Carparks Every storey of the carpark must have a system of ventilation complying with AS 1668.2 or an adequate system of permanent natural ventilation. The building is proposed to be provided with a complying ventilation system to AS1668.1 and 2.

## Room Sizes

The ceiling minimum height of 2.4m is required to areas except corridors, sanitary facilities and storage areas. Compliance is readily achievable. Plant rooms need to be checked and the correct heights allowed in the design.

## 7.0 Energy Efficiency

The building must be built in accordance with the requirements of Part J of the BCA in terms of Energy Efficiency. An Energy Efficiency consultant should be consulted and a report provided demonstrating the requirements and methods of compliance for the building. The most important part of the architect to consider is glazing. External walls need to have an R value of at least 1.8 and roofs R3.0.

### Access for maintenance

The following criteria must be observed in the special design of the plant areas apart from the issues that may be raised by the Energy Efficiency consultants.

#### NSW SECTION J ENERGY EFFICIENCY

##### NSW J8.2 Access for maintenance

Access for maintenance must be provided to—

- (a) all services and their components, including—
  - (i) time switches and motion detectors; and
  - (ii) room temperature thermostats; and
  - (iii) plant thermostats such as on boilers or refrigeration units; and
  - (iv) outside air dampers; and
  - (v) reflectors, lenses and diffusers of light fittings; and
  - (vi) heat transfer equipment; and
- (b) adjustable or motorised shading devices.

## 8.0 Window cleaning

The following item identifies the requirements for the window cleaning to the buildings on the site.

Clause	Comment	Compliance
NSWG1.101 Provision of cleaning windows	Buildings must provide a safe manner of cleaning any windows located greater than 3 or more storeys above ground level.	All windows to building proposed to be cleaned wholly from within the building. Failing this a method of cleaning these windows complying with the Construction Safety Act 1912 and regulations made under that Act must be employed.

## 9.0 Place of Public Entertainment Provisions

The building design will incorporate a theatre that will be licensed as a Place of Public Entertainment. This will be located on the ground floor level of the Northern Building and will contain a theatre for public use together with associated storage, dressing rooms and loading dock access.

The following table contains the main issues within the Building Code of Australia's for the Places of Public Entertainment as applicable to the design. The following can be adopted in the next stage of design for the buildings.

NSW H101.2 Fire separation	POPE area to be separated from other non-POPE area in 60/60/60 construction or all of the building can be considered as POPE if it complies with the POPE requirements.
NSW H101.19 Electric mains installation	The main switchboard must be enclosed in 60/60/60 construction and must be located so that it is readily accessible to authorised persons and to the Fire Brigade.
NSW H101.3 Foyer space	Only for POPE exhibiting films or live stage shows: Foyer space area must be 0.25m <sup>2</sup> for each person accommodated in the auditorium.
NSW H101.16 Storerooms	A storeroom must be separated from other parts of the building by 60/60/60 construction.
D1.2(d)(vi) Number of exits	In addition to any horizontal exit, not less than 2 exits must be provided in any storey or mezzanine within an auditorium in a POPE.
NSW D1.10 Discharge from exits	In POPE, <50% of population must discharge through the main entrance or adjacent to main entrance and the remaining via other exit.
E2.2b NSW Stages and backstages:	A building or part of a building used as an assembly building which has a stage— (i) with a floor area of more than 50 m <sup>2</sup> and not more than 150 m <sup>2</sup> must, over the stage, be provided with— (A) an automatic smoke exhaust system complying with Specification E2.2b (including Figure 2.1); or (B) roof mounted automaticsmoke-and-heat vents complying with NSW H101.22, in a single storey building or the top storey of a multi storey building; or (ii) with a floor area of more than 150 m <sup>2</sup> must, over the stage, be provided with an automatic smoke exhaust system complying with Specification E2.2b (including Figure 2.1); or (iii) equipped with means of flying scenery must, over the stage, be provided with an automatic smoke exhaust system complying with Specification E2.2b (including Figure 2.1).

## **10.0 Alternate solutions / fire engineering**

The building design will require major alternate solutions and will be identified in the next assessment of the building to ensure compliance with the Building Code.

## **11.0 Approvals from the New South Wales Fire Brigade**

The following issues may need approval from the New South Wales Fire Brigade and in some cases concurrence will be sought through a section 188 application for departures from the deemed to satisfy provisions:-

- Location of the fire control room, issues of access and height above the external ground floor level.
- Location of booster connection with respect to its proximity of the front entry to the building.