Barangaroo R8/R9 Residential

Lend Lease Project Management and Construction (Australia) P/L

8 November 2012

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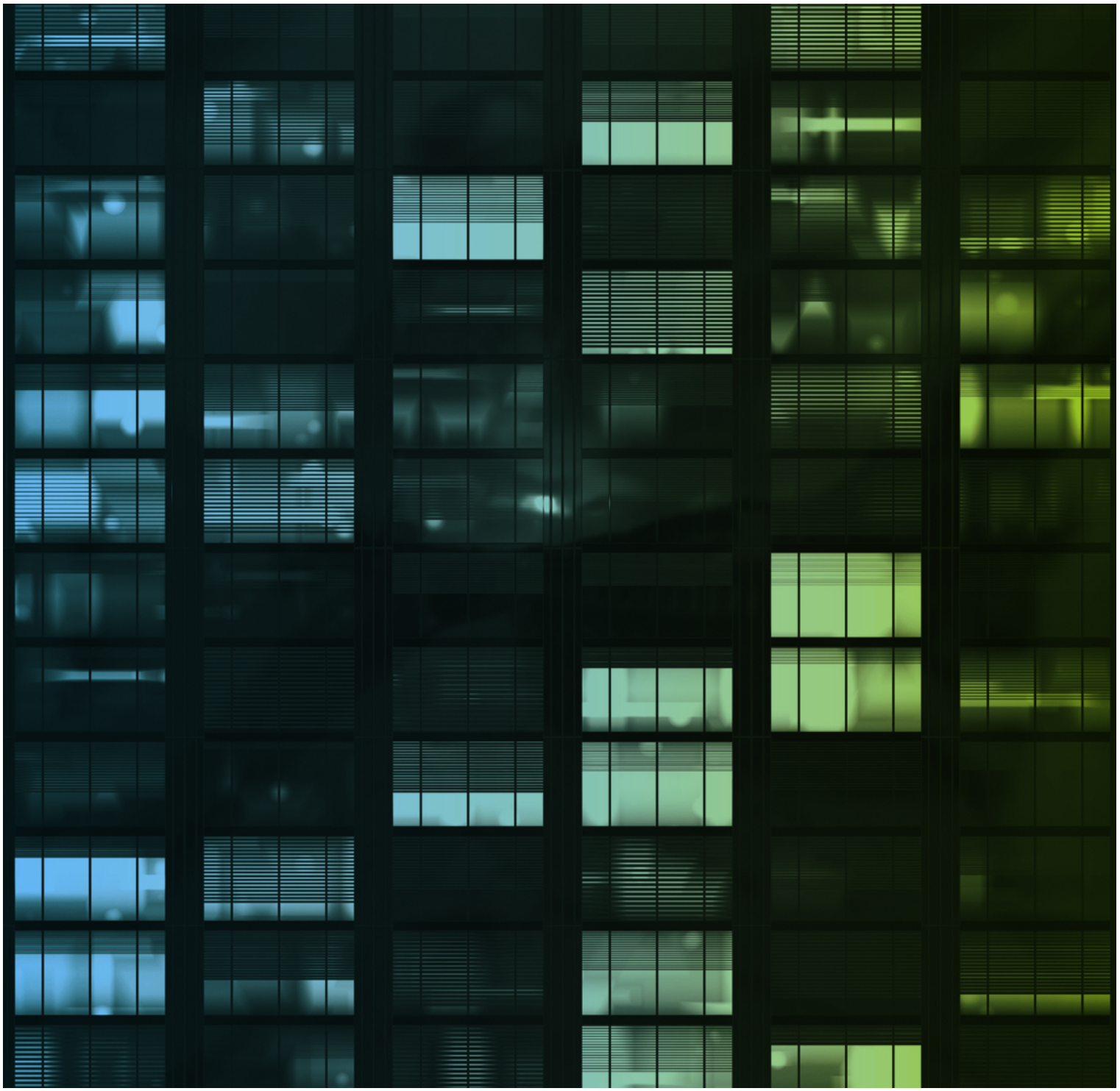
Barangaroo R8/R9 PA Report

Mechanical, Electrical, Security, Communications and Lift Services



Barangaroo R8/R9 PA Report

Mechanical, Electrical, Security, Communications and Lift Services

Lend Lease PMC

Prepared for

Lend Lease Project Management and Construction (Australia) P/L

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1.0 Executive Summary

AECOM has prepared this Mechanical, Electrical, Security, Communications and Lift Services Report to inform and accompany the Project Application for the R8 and R9 Residential Buildings at Barangaroo. In summary, AECOM advises that the project presented in the proposed R8 and R9 Residential Building Project Application can be designed and constructed utilising industry standard and proven design and construction techniques.

2.0 Introduction

2.1 Project Application

This report supports a Project Application (MP11_0002) submitted to the Minister for Planning pursuant to Part 3A of the Environmental Planning and Assessment Act 1979 (EPandA Act). The Application seeks approval for construction of two residential flat buildings (known as Buildings R8 and R9) and associated works at Barangaroo South as described in the Overview of Proposed Development section of this report.

2.2 Overview of Proposed Development

The R8 and R9 Project Applica

tion seeks approval for the construction and use of two residential flat buildings comprising 161 apartments, ground floor retail, allocation of car parking spaces from the Bulk Excavation and Basement Car Parking Project Application, and the construction of the surrounding ancillary temporary public domain and landscaping.

2.3 Site Location

Barangaroo is located on the north western edge of the Sydney Central Business District, bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east; and bounded to the south by a range of new development dominated by large CBD commercial tenants.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Central and Barangaroo South.

The R8 and R9 Project Application Site area is located within Barangaroo South as shown in Figure 1. The Project Application Site extends over land generally known and identified in the approved Concept Plan as Block X.

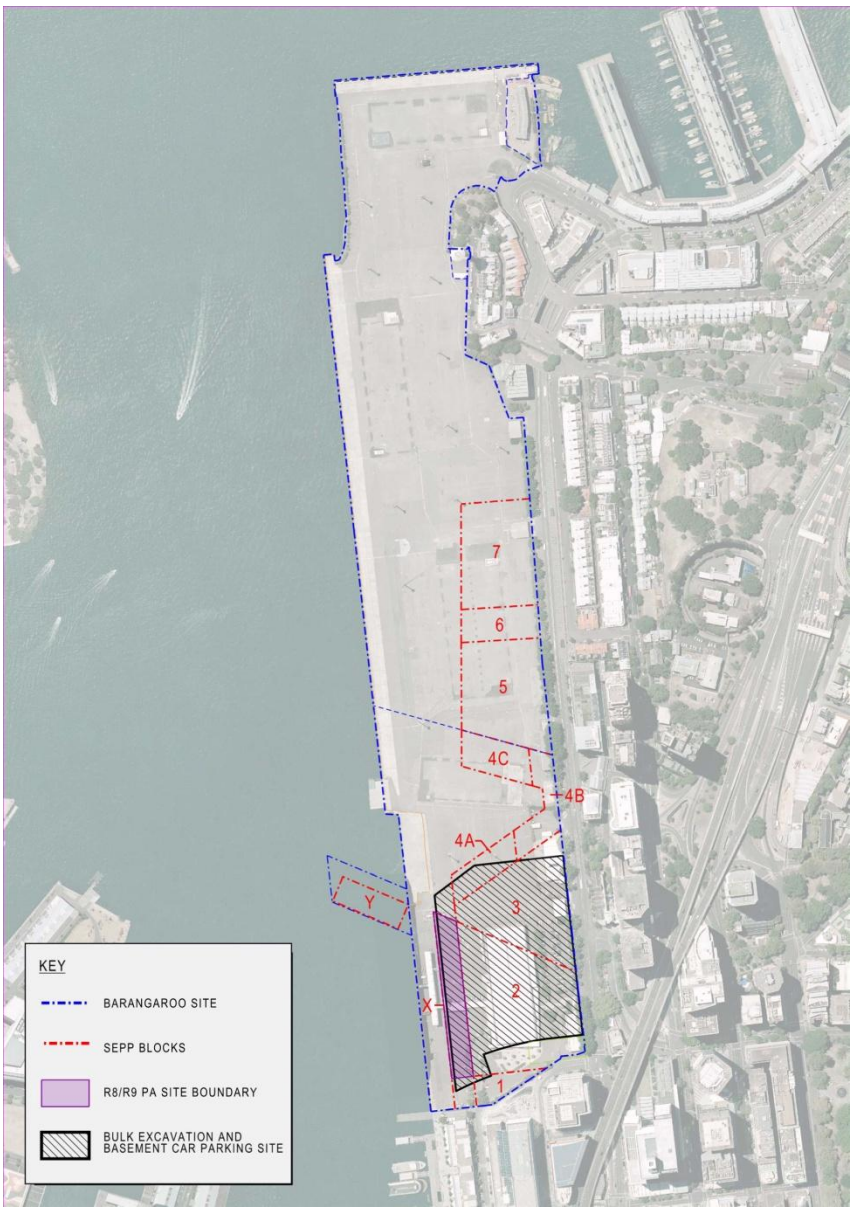

Figure 1: R8 and R9 Residential Building Project Application (MP11_0002) Aerial Site Location Plan

2.4 Services

The following services are described in this report:

- Mechanical
- Electrical
- Security
- Communications
- Lifts

3.0 Mechanical Services

3.1 Design Criteria

The buildings mechanical services systems will generally be designed to achieve the following requirements.

3.1.1 External Design Conditions

The following ambient design conditions used for the Sydney CBD:

- Summer: 31.1°C DB, 22.7°C WB
- Winter: 7°C DB

3.1.2 Internal Design Conditions

The following values will be applied to the design, with assessment for modification as noted.

Retail Tenancies

Summer 23.5°C DB ± 1.5°C

Winter 21.0°C DB ± 1.5°C

Residential

Summer 23.0°C DB ± 1.5°C

Winter 21.0°C DB ± 1.5°C

Humidity will not be controlled in general areas however inherent psychrometric characteristics should limit the maximum internal relative humidity to 60% under most ambient conditions. Minimum humidity levels are not controlled except where indicated for internal room criteria.

Lobbies are to be naturally ventilated with no temperature control provided.

3.1.3 Internal Design Criteria

The air conditioning systems shall be capable of providing cooling and heating capacities to satisfy the following internal load densities and outdoor air loads. The following loads may be re-assessed and modifications made.

Room Description	Room Conditions (°C DB)	Population	Lights (W/m²)	Equipment (W/m²)
Retail – Food	23.5	1 Person / 5m²	30	70
Retail – Non Food	23.5	1 Person / 6m²	40	5
Apartments	23	1 Person / 20m²	20	10
Mail Room	23	1 Person	12	15

The mechanical systems shall be designed to comply with the maximum noise levels nominated in the Renzo Tonin Acoustic Report.

3.1.4 District Cooling Plant

Chilled water generated in the district cooling plant shall be reticulated to a chilled water distribution room located in the basement beneath both R8 and R9. The chilled water circuit serving the retail and residential fan coil units shall be a closed loop system, transferring thermal energy from the conditioned spaces to the centralised chilled water system via variable speed chilled water pumps. All pumps are to have high efficiency motors.

The chilled water to the retail tenancies shall be distributed via a dedicated chilled water pump set.

The chilled water to the residential tenancies shall be distributed via a dedicated chilled water pump set.

3.1.5 Heating Plant

A de-centralised natural gas fired hot water generator system shall be located within a roof top plant room on each residential tower to provide heating hot water to the fan coil units.

3.2 Proposed Air Conditioning Systems

Chilled water pipework shall reticulate from the basement heat exchanger and chilled water pump room throughout each of the buildings via chilled water pipe risers located adjacent to the lift cores with access to each level.

Heating hot water pipework shall reticulate from hot water generator plant room, located on the roof of each building, throughout each of the buildings via heating hot water pipe risers located adjacent to the chilled water pipe risers with access to each level.

3.2.1 Natural Ventilation

All lift lobbies are to be naturally ventilated with the exception of the northern most lift lobby of R8. The fire stairs serving each lift lobby are to have sufficient free area open to the external environment to provide adequate fresh air to each of these spaces.

3.3 Mechanical Ventilation

- Outdoor Air – General — To AS 1668.2
- Apartment Outdoor Air — 85 – 120 L/s / apartment
- Bathroom / Ensuites — 50 L/s
- Apartment Laundries — 60 L/s
- Range Hood Exhaust — 100 L/s
- Apartment Garbage Rooms — 30 L/s
- Kitchen Exhaust (10 kitchens per building) — 2000 L/s per kitchen
- Toilet Exhaust — To AS 1668.2 (not less than 10 Air Changes)
- Stair Pressurisation — To AS 1668.1

3.3.1 Residential Apartments

Air Conditioning

The air conditioning system is intended to consist of:

- Low profile chilled and heating water ceiling mounted fan coil units (complete with thermal meters and controls) located above amenities areas, walk-in wardrobes and above kitchen areas within localised bulk heads.

Mechanical Ventilation

The residential apartments shall be provided with a decentralised toilet exhaust and general exhaust system comprising of multiple toilet exhaust and general exhaust risers serving multiple apartments.

The toilet exhaust system shall provide both toilet exhaust and laundry exhaust to each apartment via fire dampers and fans located at roof level complete with attenuation.

The general exhaust system shall provide exhaust to kitchen range hoods via fire dampers and fans located at roof level complete with attenuation.

Outdoor air shall be transferred from each lift lobby into each residential apartment via an acoustic transfer duct and fire damper to provide make-up air for the mechanical exhaust systems.

The northern most corridor of R8 shall be provided with mechanical ventilation. An outdoor air fan, located at roof level shall supply filtered fresh air to each level via a fire rated stair pressurisation relief / fresh air shaft. This outdoor air fan shall trip in fire mode to facilitate the stair pressurisation relief air system described below.

3.3.2 Retail

Air Conditioning

A dedicated chilled and heating water system shall be provided to serve the retail tenancies complete with thermal meters and isolation valves. Connection of the tenancy air conditioning units to the base building chilled and heating water circuit shall be by the tenant.

Kitchen Exhaust

The retail tenancies located on the ground floor of both R8 and R9 shall be provided with a commercial kitchen exhaust system comprising of roof mounted variable speed kitchen exhaust fan and rigid ductwork capped off for future connection by each tenant. The kitchen exhaust system for each building shall be sized to provide a total of 20,000 L/s kitchen exhaust.

Toilet Exhaust

The ground floor amenities, located in both R8 and R9 shall be provided with a decentralised toilet exhaust system and toilet exhaust fans located within a fan room.

3.4 Smoke Hazard Management

The smoke hazard management systems shall operate in accordance with the requirements of the NCC, Fire Engineering Report and the relevant Standards.

The smoke control systems shall be system shut down for both R8 and R9.

The fire stair located within the northern module of R8 shall be provided with a stair pressurisation system to suit the system shut down strategy. The mechanical system shall operate during Fire Mode and comprise of stair pressurisation shafts to serve each of the scissor stairs. Air shall be relieved from the affected corridors via the stair pressurisation relief / supply air shaft and discharge to atmosphere.

3.5 Noise and Vibration

The mechanical systems, including all plant, shall be assessed by the acoustic engineer and treated if required to meet the acoustic performance criteria stated in the Acoustic Report and AS 2107.

3.6 Building Automation System

A computerised Building Management and Control System (BMCS) shall be used to automatically control, monitor and provide alarms for the nominated building services.

4.0 Lifts

4.1 Design Criteria

The lift design for the R8/R9 Residential Towers shall achieve a level of service commensurate with similar luxury developments.

Indicative Performance Guidelines

Occupancy	2 persons/ bedroom
Lift Traffic Type	5 minute, 2 way.
Interval	45 - 50 seconds
Handling Capacity	8%

(Note: The above figures are generally accepted industry standard guidelines and are used in lieu of any published standards or performance criteria for residential buildings.)

4.2 Residential Lifts

Type:	Machine Room Less (MRL).
Drive:	Regenerative VVVF.
Machine Type/Rating:	Gearless Traction, 180 starts/hour.
Classification:	Passenger.
Rated Load:	1275 kg (17 passenger).
Rated Speed:	1.6 m/s
Control System:	Microprocessor.
Clear Car Internal Dimensions:	1450 mm x 1950 mm, through-entrance.
Clear Car Height	2800 mm
Facilities for Persons with Disabilities:	Fully compliant with AS1735.12
Door Type:	2 x panel, centre-opening, horizontal-sliding, power-operated.
Door Dimensions:	1000 mm wide x 2100 mm high.
Internal Liftwell Dimensions:	2600 mm wide x 2550 mm deep.
Headroom (Overrun):	4700 mm.
Pit Depth:	1900 mm.

4.3 Retail Lifts

Type:	Machine Room Less (MRL).
Drive:	Regenerative VVVF.
Machine Type/Rating:	Gearless Traction, 180 starts/hour.
Classification:	Passenger/Goods
Rated Load:	1600 kg (21 passenger).
Rated Speed:	1.0 m/s
Control System:	Microprocessor.
Clear Car Internal Dimensions:	1750 mm x 1950 mm, through-entrance.
Clear Car Height	2800 mm
Facilities for Persons with Disabilities:	Fully compliant with AS1735.12
Door Type:	2 x panel, side-opening, horizontal-sliding, power-operated.
Door Dimensions:	1300 mm wide x 2100 mm high.

Internal Liftwell Dimensions:	2550 mm wide x 2600 mm deep.
Headroom (Overrun):	4700 mm.
Pit Depth:	1900 mm.

(Note: The dimensions shown in the above tables are indicative only and are subject to final confirmation by the lift contractor.)

4.4 Sustainable Design

The lifts shall be designed to minimise energy use where appropriate. The lifts shall feature Variable Voltage Variable Frequency (VVVF) Regenerative Power drives.

In addition to the above the following shall also be included in the design;

- Efficient, permanent magnet, gearless motors.
- LED down-lights or compact fluorescent type energy efficient car lighting.
- A facility to automatically switch off the car lighting and ventilation when the lifts are not in use.

4.5 Facilities for Persons with Disabilities

All lifts shall be provided with facilities for persons with disabilities in accordance with AS1735.12.

4.6 Fire Service

All lifts shall be fitted with fire service control to comply with the BCA.

4.7 Lift Restricted Access (Security)

All lifts shall be fully integrated with the building restricted access (security) control system and include the following;

- Electronic swipe card reader in the lift cars to restrict access at the building entry and nominated floors
- Intercom interface to restrict access at nominated floors.
- Provision for in-car CCTV coverage if required.

4.8 Maintenance Requirements

The lifts shall be designed to include the latest proven technology, reliability and maintainability provided by reputable manufacturers.

4.9 Standards and Design

The lift installation shall be designed in accordance with the following;

- AS1735.1 General Requirements - Lifts, Escalators and Moving Walks.
- AS1735.12 Facilities for Persons with Disabilities.
- AS/NZS 3000 Wiring Rules.
- The NCC/Building Code of Australia (BCA).
- Work Health and Safety Regulations.

5.0 Electrical Services

5.1 Infrastructure

The R8/R9 residential buildings shall be provided with incoming power supply from the Barangaroo Precinct HV/Substation infrastructure. This is not being undertaken as part of the R8/R9 Residential project, but fire rated consumer's mains and fire rated main switchrooms shall be provided within the basement to serve the R8/R9 residential buildings.

Each building shall have its own consumer's mains and main switchroom, providing cabling and distribution to retail and apartment's tenants as well as house services loads.

There shall be no standby generator power provisions for the R8/R9 residential buildings.

All tenants shall be metered separately using an embedded network, utilising NMI metering. House metering within each residential building (including retail tenanted levels) shall be metered on a stratum basis. Thermal, gas and water meters shall be interfaced into the energy metering system.

Power factor correction equipment shall be installed where required to maintain the power factor of house services to a minimum of 0.90 at all times.

Earthing systems shall be in accordance with AS3000 for MEN systems.

Lightning protection systems shall be provided in accordance with AS1768.

5.2 Standards and Design

The electrical services installation shall be developed in accordance with the following standards;

- AS3000 (Wiring Rules)
- AS3008
- AS1768
- AS1680
- AS2293
- NCC/Building Code of Australia

5.3 Reticulation and Cable Management

Each retail or residential tenant shall be provided with a separately metered submain designed in accordance with AS3008.

Generally, each residential building contains 4 cores, each core containing electrical and communications risers, accessible from the lift lobbies at each level.

These risers shall contain cabling and some distribution equipment to serve residential and retail tenants as well as house/common area requirements.

5.4 Distribution Boards

House Distribution boards (DB's) shall be readily accessible situated in main switchrooms, riser cupboards or plant rooms specifically designed for the purpose. Outgoing circuits shall be protected by circuit breakers.

Retail tenant DBs shall be located to suit the tenants requirements.

Apartment DBs shall be located within apartment cupboards/joinery.

5.5 General Purpose Outlets

Earth leakage protection shall be provided in accordance with AS3000 requirements.

General purpose outlets to lobbies, mail rooms, lift lobbies, store rooms, riser cupboards, amenities, etc for equipment, cleaning and general usage shall be provided.

General purpose outlets requirements within the residential apartments shall be designed to suit the apartment layout and function, including any specific adaptable housing requirements.

General purpose outlets requirements within the retail shops shall be the responsibility of the individual tenant.

5.6 Lighting

Lighting shall be provided in accordance with the requirements of AS1680 and NCC/BCA.

5.6.1 Residential Apartments

Residential apartment lighting shall be energy efficient, dimmable and switched lighting, locally controlled to suit Green Star and BASIX requirements.

A number of apartments shall have the lighting design to suit adaptable housing requirements.

5.6.2 Retail Tenants

Lighting requirements within the retail shops shall be the responsibility of the individual tenant.

5.6.3 Common/House Areas

LED, fluorescent or other discharge type lighting of type suited to task shall be provided in all other areas of the project, including:

- corridors, stairs and lift lobbies
- plant rooms;
- riser cupboards, rooms;
- toilets, cleaners rooms, and
- store rooms.

5.6.4 External Lighting

External building feature lighting shall be installed to provide interest and to highlight architectural features. External lighting shall be installed to public domain areas within the R8/R9 site.

No light beam shall be directed beyond the site boundaries or upwards without falling directly on a surface to minimise light pollution. Lighting shall be controlled by photoelectric cells and/or time switches.

5.6.5 Exit and Emergency Lighting

Emergency and evacuation and exit signs complying with the requirements of the BCA and AS2293.1 shall be provided to the house/common areas.

Emergency lighting provisions to AS2293.1 shall be provided for shell and core retail tenancies. Modifications to the emergency lighting and general fitout lighting are the responsibility of the tenant.

5.7 Lighting Controls

5.7.1 House Areas

An automated lighting controller (based on time clock) is to be provided in each house distribution board. Lighting to common areas shall also utilise motion sensing in parallel with the time clock for control.

Motion sensors shall be provided in the toilets and other low-trafficable areas (fire stairs) to control lighting when movement is detected and ensure efficiency and safety is optimised.

5.7.2 Residential Apartments

Apartment lighting shall be controlled at multiple switch panels within each apartment.

5.7.3 Retail tenants

Lighting control requirements within the retail shops shall be the responsibility of the individual tenant.

5.8 Smoke Alarms

Smoke alarms will be provided to the residential apartments to AS3786.

5.9 Photo-Voltaic Array

A photovoltaic (PV) array is proposed on the building roof to provide a renewable electrical supply. The PV array shall be connected to the Barangaroo Precinct grid via DC to AC inverter systems.

The rooftop PV array shall be connected to the base building supply and be separately metered. Renewable Energy Certificates generated from the system will be assigned to the Authority for the purposes of achieving a carbon neutral outcome for the precinct.

6.0 Communication Services

6.1 Infrastructure

The R8/R9 residential buildings shall be provided with incoming communications services from the Barangaroo Precinct infrastructure. This is not being undertaken as part of the R8/R9 Residential project, but suitably rated fibre optic and/or copper cabling shall be provided within the basement to serve the R8/R9 residential buildings.

Each building shall have its own BD Room (suitable for installation of electronic/active equipment), providing cabling and distribution of communications services to retail and residential tenants as well as house/common areas.

6.2 Standards and Design

The communications services installation shall be developed in accordance with the following standards;

- CCM (ACMA Communications Cabling Manual)
- AS/ACIF 008
- AS/ACIF 009 (Wiring Rules)
- AS3084
- NCC/Building Code of Australia

6.3 Reticulation and Cable Management

Each retail or residential tenant shall be provided with a dedicated incoming communication service cable (fibre and/or copper).

Generally, each residential building contains 4 cores, each core containing electrical and communications risers, accessible from the lift lobbies at each level.

These risers shall contain cabling and some distribution equipment to serve residential and retail tenants as well as house/common area requirements.

These communications risers will also accommodate security and MATV distribution cabling and equipment.

6.4 MATV

A dedicated clear space will be provided for an MATV antenna located above one of the roof top plant rooms.

While actual MATV distribution for the precinct has not yet been finalised, space allocations for R8 and R9 dedicated systems have been made.

A MATV backbone will be provided with antenna and head end equipment. The system will be suitable for digital television signals and Pay TV connections.

6.5 Retail

Communications wiring shall be run on cable trays in false ceiling areas from the BD Rooms to each retail tenancy.

Retail tenant distributors shall be located to suit the tenants requirements.

Communications outlets requirements within the retail shops shall be the responsibility of the individual tenant.

7.0 Security Services

7.1 Infrastructure

The R8/R9 residential buildings shall be provided with standalone access control, intruder detection and CCTV services. The systems will interface to a precinct security room for overall monitoring and management.

The standalone security systems headend will be housed in each building BD Room, with any necessary data gathering panels distributed within the building risers. Generally intercoms, CCTV and some access control and intruder detection devices will be IP based.

7.2 Standards and Design

The security services installation shall be developed in accordance with the following standards;

- AS/NZS 2201
- AS/NZS 4806

7.3 Access Control

Each residential building will be provided with an access control system, which will control access by proximity card or other approved means to:

- Lifts;
- Car Parks (through interface to precinct system);
- Main Entries;
- Conduits will be provided in the fire stairs for future installation of proximity card access control to allow re-entry on select levels

Apartment access control systems within the individual apartments shall be the responsibility of the individual tenant.

7.4 CCTV System

The building will be provided with a CCTV surveillance system. CCTV cameras will provide coverage of:

- Building perimeter;
- All entries and exits;
- Main Lobbies and Mail Rooms;
- Car park entrance and Loading Docks (through precinct system);
- Lift cars subject to further assessment.

The cameras will be of high resolution and connected to a digital recording system; either through Digital Video Recorders (DVR's) or hard drive Local Area Network (LAN) based system. The system will have the capability to be monitored at a central security station within the precinct.

7.5 Intruder Detection

All perimeter doors, fire stair doors, plant room doors and access controlled doors will be monitored via reed switches, with monitoring and alarms via the standalone security head end system.

Ground Floor and Penthouse apartments will be provided with alarm systems.

Alarm systems in other apartments will be the responsibility of the tenant.

7.6 Intercommunication System

Building entry points shall be provided with an IP based video intercom system comprising call stations at each entry point to each apartment. Lifts shall have intercom interface provisions and carpark entry will be interfaced to the precinct system.

Provision for fire stair re-entry intercoms in the R8 northern module shall be provided.