



UNITED
BY OUR
DIFFERENCE



FRASERS CENTRAL PARK

Block 1 Residential and combined basement
Building Services and combined basement

State Significant Development Application Report

27/06/2014

Quality Management

Issue/revision	Revision 1	Revision 2	Revision 3		
Remarks	SSDA	SSDA	SSDA		
Date	23/05/2014	20/06/2014	27/06/2014		
Prepared by	AAS/BJM/DKF/ SJ/RXS	AAS/BJM/DKF/ SJ/RXS	AAS/BJM/DKF/ SJ/RXS		
Authorised by	RAB	RAB	RAB		
Project Number	SYD1224100	SYD1224100	SYD1224100		
Amendments		Incorporating Client comments	Final		

FRASERS CENTRAL PARK

Block 1 Residential and combined basement

Building Services

State Significant Development Application Report

27/06/2014

Client

Central Park JV No. 2,
Suite 11, Lumiere Commercial
Level 12, 101 Bathurst Street
Sydney NSW 2000

Consultant

WSP Buildings (Pty) Ltd.
Tel: 8907 0900

WSP Contacts

John Osborne	Project Director
Rob Beck	Project Leader

Table of Contents

1	Executive Summary.....	5
2	Introduction	5
3	Precinct Approach	6
4	Mechanical Services	7
5	Electrical Services	9
6	Communications Services.....	10
7	Fire Services.....	11
8	Hydraulic Services	12
9	Vertical Transportation.....	13
10	Fire Safety Engineering	14

1 Executive Summary

The State Significant Development (SSD) Application proposed the redevelopment Block 1 as an 18 storey residential flat building, with ground floor non-residential/retail uses, 17 levels of residential apartments, roof plant room, and four levels of combined basement below Block 1 and Block 4N. The proposed building will accommodate a total of 281 apartments, with a mix of unit sizes and types.

The proposal has a mixed GFA of non-residential purposes and residential purposes in accordance with the Concept Plan latest modification (MP 06_0171 MOD9).

Communal spaces, including pool, gym, change facilities, terraces and lounge areas will be provided throughout the building on levels 2 and 16 with views over Central Park. Residential entry will be provided from the eastern façade on Chippendale Way, with non-residential/retail active uses along the northern, eastern, southern and western façades at ground floor.

A combined basement below Block 1 and 4N is proposed, that will accommodate all car parking, bicycle parking, residential and commercial storage, waste handling, and servicing for both buildings, including location of plant and building services, with connection into Central Park's Central Thermal/Plant Tri Generation Plant. The basement will accommodate car parking spaces, for the proposed Block 1 use. Additional spaces are provided within the basement that will service the future building above on Block 4N.

2 Introduction

The following description outlines the engineering services being provided for the Block 1 building to be constructed on the Frasers Central Park precinct development in Chippendale, NSW.

The project involves the construction of a new multi-storey buildings known as Block 1, designed by Foster and Partners with PTW as collaborating local architects.

The building is to be designed to achieve a minimum 5 Star Green Star Multi Unit Residential v1 rating (Design and As-Built), in accordance with Central Park's Ecologically Sustainable Development (ESD) targets. A separate ESD report is provided as part of the SSDA for Block 1, which describes the sustainability initiatives incorporated.

The design objective is to provide a facility which will optimise the opportunities for the reduction in the use of energy and water. The design will aim to reduce electricity consumption, which has a significant impact on greenhouse gas emissions through the use of coal for electricity generation. Potable water use in the building will also be minimised.

Low energy use and reduced water consumption will be achieved by the design of highly efficient systems with the capability to closely control operation. Excessive ventilating, cooling, heating and water consumption will be avoided through careful design of these systems.

The building fabric has been carefully designed to reduce heat transfer. Solar gain through the glazing is also reduced through the use of high performance glazing and incorporation of external shading as required to further reduce the direct solar radiation to the building.

All building services systems will be designed to meet the Building Code of Australia and relevant associated Australian standards that are current at the time of this report.

Some specific system design features under consideration are listed as follows:

- Low flow rate sanitary fixtures to conserve potable water consumption and reduce flow to sewers.
- Efficient lighting system to reduce electricity consumption.
- Linkage with precinct wide Central Thermal Plant and Tri-generation Plant.
- Linkage with precinct wide Recycled Water Treatment Plant.

3 Precinct Approach

Consistent with the approved Central Park concept plan (as amended) each building is to target a minimum 5 Star Green Star rating which shall be assisted through the incorporation of site wide initiatives of tri-generation and central water recycling. As such, the development of the Block 1 Residential building will target 5 Star Green Star Multi Unit Residential rating (Design and As-Built). The completed tri-generation plant produces electricity via the combustion of natural gas. The by-product of producing electricity via a gas engine is waste heat. The waste heat energy is in equal order of magnitude to the electrical energy produced. This waste heat is then converted into hot water and chilled water.

The chilled water is produced via the utilisation of absorption chillers within a central thermal plant which will meet the base off-peak mechanical load of the site. This central thermal plant will also have electric chillers for peak demand over and above that provided by the absorption chillers, back up electric chillers, back up boilers and back up diesel generators.

The electricity produced will be used for the peak demand electric chillers with any excess electricity being potentially exported during off-peak periods. If additional capacity is provided within the Central Thermal Plant, then there may be the potential opportunity to utilise this energy within Blocks 1. The chilled and hot water is to be reticulated to each building where heat exchangers will allow each building to make use of the services provided by the central thermal plant. Heat rejection by cooling towers for the central thermal plant will be required across the site. Thermal energy storage will also be employed to balance energy demand between peak and off-peak time, thus reducing the requirements for heat rejection.

The building heating and cooling loads are to be provided by the Central Thermal Plant.

The centralized recycled water system is to consist of a 1,000kL recycled water treatment plant. The recycled water treatment plant is to collect waste water from toilets, showers, sinks and rainwater from the roof of the buildings and is to utilise sewer mining to treat blackwater to a Grade A standard. This Treated non potable water will be reticulated to each building to serve all of the non-potable demands, i.e. toilet flushing, laundry, irrigation, cooling tower demand and general washdown. Excess non potable water has the potential to be exported off site. Potable water mains will also be reticulated to each building to serve all potable demands.

4 Mechanical Services

The mechanical services will be designed in accordance with the following code and authority requirements:

- Building Code of Australia
- AS/NZS 1668.1 and AS/NZS 1668.2
- City of Sydney Council Requirements
- AS 3666
- AS 1682
- AS 5601
- AS 4254
- AS/NZS 3000

The residential air conditioning system shall consist of 4-pipe fan coil units (FCUs) serving individual apartment units. Each unit shall be complete with individual control and smart metering.

The chilled and heating hot water is provided by a decoupled hydronic system served by the Central Thermal Plant's (CTP) district heating and cooling system. Plate heat exchangers, secondary pumps and ancillary plant shall be located within the basement and distribute pipework via Block 1's core risers.

All apartment and retail unit's chilled water and heating hot water supply shall be metered separately.

Each apartment unit is provided with a dedicated toilet and kitchen exhaust booster system, exhausting into separate dedicated centralised risers. Toilet and kitchen exhaust risers shall combine at roof level and centrally exhausted by a pressure dependant exhaust fan.

Make-up ventilation is provided via a naturally ventilated façade from the corridor and acoustically treated openings within the ceiling void to each apartment unit. Non-return dampers shall be fitted to façade louvres and make-up openings to units.

All ductwork shall be fitted with fire dampers and appropriate access in accordance with AS 1682.

Outside air provisions to each apartment unit shall be provided by a natural ventilation solution in accordance with the BCA. Openable windows shall be sized in excess of 5% of the floor area of the room to be ventilated.

The retail tenancies will be provided with pipe connections for future fit out provisions. Local external louvres shall also be provided for standalone ventilation requirements.

Dedicated stair pressurisation and mechanical relief risers shall be provided to provide safe means of escape during a fire.

The car park supply and exhaust ventilation system incorporates variable speed fan drives controlled by CO and NO₂ sensors as appropriate. Car park supply and exhaust ventilation shall be provided to basement areas in accordance with AS 1668.2.

A naturally ventilated solution shall be provided to serve the sub-station in accordance with Ausgrid NS113 specification requirements.

Ancillary ventilation systems shall be provided. These include lift lobby areas, pool, changing facilities and reception area.

All supply and exhaust ventilation systems will incorporate variable speed fan drives.

5 Electrical Services

The electrical services will be designed in accordance with the following code and authority requirements:

- Building Code of Australia
- City of Sydney Council Requirements
- AS/NZS 3000
- AS/NZS 1680.0
- AS/NZS 1768
- AS 2293.1
- Energy Australia Requirements

The building will be supplied via an Ausgrid substation located within the basement area. The building will also be provided with a main switchroom that will be located within close proximity to its associated substation. Dependant on the final capacity of the Tri-generation system associated with the Central Thermal Plant, there may be the opportunity to utilise the excess electricity within Block 1.

Submains will be run horizontally through the basement car park areas and vertically in electrical risers to service the buildings above.

Each apartment shall contain a dedicated distribution board located within an apartment cupboard space. Each apartment shall be separately metered. Distribution boards shall be of the single or three-phase if required, surface mounted, insulated load centre type. Distribution Boards shall be of minimum 100Amp rating and 18 pole capacity.

Retail tenancies will be provided with separately metered electrical supplies.

Lighting for apartments shall be selected in accordance with BASIX requirements and shall be designed to meet the lighting levels nominated in AS1680. The lighting will be installed to ensure that the thermal envelope is not compromised at junctions with the building insulation (e.g. where downlights are to be installed under roof slabs).

Back of house areas and amenities areas will be provided with light fittings utilising either linear T5 or compact fluorescent lamps with electronic ballasts as required to suit the particular area.

The exterior lighting will consist of purpose selected exterior landscape luminaires to ensure long life and accurate illumination with a minimum of spill light. Metal halide sources will be used for increased colour rendering and sense of safety. Security lighting shall be designed to the requirements of AS1158.3 and will conform to AS4282. The lighting will be arranged so that illumination is uniform and dark areas minimized. All luminaires and accessories will be suitable for outdoor use and will be vandal and weather resistant to suit the location.

Time schedule programmes and occupancy sensor controls and local switching will be used for car parks, back of house and amenity areas to suit the usage.

External lighting will be provided around the buildings in accordance with AS 1158 and AS 4282. External luminaires will be selected to be in keeping with the general building design and in accordance with Sydney City Council requirements. External lighting will be time clock and light level controlled.

Emergency escape lighting and exit signs will be provided throughout the buildings to comply with BCA and AS 2293.

A conventional lightning protection system will be provided for the buildings in accordance with the requirements of AS/NZS 1768.

6 Communications Services

The communications services will be designed in accordance with the following code and authority requirements:

- Australian Communications and Media Authority Requirements
- AS/NZS 3000
- AS/AC S008
- AS/AC S009

Dedicated Building Distributor Rooms will be provided for the accommodation of equipment from multiple telecommunications carriers. Telecommunications backbone cabling will be provided from the Building Distributor to the lifts, fire control centre and building management systems.

A digital compatible MATV system will be provided to each apartment and retail tenancy to distribute free to air television broadcasts. Provision will be available for the installation of Pay TV system cabling and equipment.

A base building access control system will be provided to control the building entry points for both personnel and vehicles. Access control will also be provided to each lift for individual floor access.

CCTV monitoring will be provided to foyers and entry lobbies, main public areas, retail common areas, car park and ground floor lift lobbies, goods lifts, loading docks, building entry and exit points and car park entry and exit points. The CCTV coverage will be viewed and controlled by 24 hour security staff from a centralised security room.

7 Fire Services

The Fire Services will be designed in accordance with the following code and authority requirements:

- Building Code of Australia
- AS 2118.1
- AS 2118.6
- AS 1670.1
- AS 1668.1
- AS 1670.4
- AS 2419.1
- AS 2441
- AS 2444
- City of Sydney Council Requirements

A fire control room will be located at ground level of Block 1 to serve the West Zone buildings, comprising Blocks 1 and 4 North buildings including the combined basement carpark, the heritage hotel on Abercrombie Street, the Brewery building and Central Thermal Plant and Block 4s building. A master fire indicator panel will be provided in the fire control room receiving input from the fire panels within those buildings.

A main fire indicator panel will be provided in the fire control room to serve Blocks 1 and 4 North buildings and the combined basement carpark. A sub fire indicator panel will be provided in the heritage hotel, and mimic panels will be provided in the main entrance foyers of Block 1 and Block 4 North.

A smoke detection and alarm system will be provided throughout to call the fire brigade, initiate the sound system and intercom system for emergency purposes, initiate the smoke hazard management and initiate the fire mode operation of other services systems.

A fire fan control panel will be provided in the fire control room to enable automatic operation of the smoke control systems in a fire condition, and will be provided with manual control switches to allow the fire brigade to override the automatic operation.

A sound system and intercom system for emergency purposes will be provided throughout and will be initiated by the fire alarm system. The main emergency control panel for Blocks 1 and 4 North buildings will be located in the fire control room, and a sub emergency control panel will be provided in the lobby of the heritage hotel.

A combined fire sprinkler / hydrant system will be provided to serve the Blocks 1 and 4 North buildings, and the combined basement carpark, and extended through the heritage hotel. The system will be served by a central plant comprising of a primary electric booster pump, a secondary diesel pump, and a diesel relay pump for brigade to boost the high level pressure zones. A dedicated town main connection and a water storage tank located in the basement will be provided as the Grade 1 water supply arrangement. A fire brigade booster assembly will be located at ground level.

Fire hose reels will be provided throughout and will be supplied from a metered connection.

Fire extinguishers will be provided throughout to suit the risk.

8 Hydraulic Services

The Hydraulic Services will be designed in accordance with the following code and authority requirements:

- Building Code of Australia
- AS/NZS3500
- AS/NZS5601.1
- AS2419.1
- AS2441
- Sydney Water Corporation
- City of Sydney Council requirements
- Jemena requirements

Appropriately sized new sewer connections will be made to the sites infrastructure / authority infrastructure.

Trade waste treatment will be provided to each block to treat any trade waste generated within the blocks. Treated trade waste will drain to the sanitary drainage system.

New water service connections will be extended from site infrastructure. Cold water pump sets will be provided to reticulate cold water as required. In addition to authority meter, private sub-meters will be installed to monitor the water usage of individual building zones.

Non Potable Cold Water (NPCW) service connections will be extended from site infrastructure provided by the Recycled Water Treatment Plant (RWTP) within One Central Park (Block 2) to serve non potable water uses within Blocks 1. Pump sets will be provided to reticulate NPCW water as required.

Domestic hot water heat exchangers will be located local to each core to serve each block individually. The heat exchangers will be powered from site infrastructure district heating supply.

A metered gas services will be provided to serve Blocks 1 from the site infrastructure.

Reticulation of gas services with separate sub-metering will also be provided throughout the retail and residential apartments to facilitate sub leasing and metering as appropriate.

Stormwater run-off will be collected from all roof and terrace areas and will be harvested for re use within the development via the RWTP.

All sanitary fixtures and tap ware will comply with Greenstar and BASIX requirements as per the details below:

- Toilets to be 4 Star WELS rated or better.
- Bathroom and kitchen taps to be 6 Star WELS rated or better.
- Showers to be 3 Star WELS rated, flow rate >6 but ≤7.5L/min max.

9 Vertical Transportation

The Vertical Transportation Services will be designed in accordance with the following code and authority requirements:

- National Construction Code 2013
- AS 1428.2
- AS/NZS 4431
- AS 1735.12
- City of Sydney Council Requirements
- AS/NZS 3000
- AS/NZS 3008
- Occupational Health & Safety Requirements
- ISO 9001

Block 1 shall be a residential building with retail provisions on the Ground Level. There are four basement levels below Ground for car parking.

Four (4) dedicated passenger lifts shall be provided to serve Ground, all residential apartment levels and all car parking levels below Ground. A dedicated retail Goods lift shall be provided for the retail outlets, serving Basement 1 to Ground

All lifts will have the capability for CCTV monitoring.

There will be provisions for emergency lifts within each building. These lifts capable shall be in accordance with NCC requirements.

All lifts will be compliant with disabled person's requirements. All lifts have shall be specified to comply with AS 1735.12 and AS1428.1/2.

Energy efficient lighting will be used in all lifts to minimise energy consumption. Passenger lifts in the building will also be provided with the ability to feedback regenerated power back into the building's power grid, to further improve the energy efficiency.

The vertical transportation system will be designed to interface with relevant fire, BMS and security requirements. A specialist lift monitoring system will also be implemented to allow remote monitoring and remote control of the lifts.

10 Fire Safety Engineering

Introduction

It is proposed to develop a holistic fire safety strategy for the development to ensure an appropriate occupant fire life safety and fire brigade intervention design. The fire safety strategy will detail a package of fire protection measures and how it relates to occupant egress, structural fire resistance, and fire brigade intervention. Initial thoughts are presented below, including a discussion of major Alternative Solutions to be developed and documented in the final Fire Engineering Report (FER) to demonstrate compliance with the Performance Requirements of the BCA. It is likely that further non-compliances may be identified during design development which will be addressed through design changes or Alternative Solutions as appropriate.

Occupant Egress

Occupant egress will be reliant on a passive fire and smoke separation, sprinkler protection, early detection of a fire and occupant warning, emergency lighting and exit signage, protection of egress stairs with pressurisation systems, and purging of corridors to ensure tenability is maintained.

The Ground floor comprises primarily of individual retail units. There is also a residential entry lobby providing access to the lifts serving the residential floors above. Egress from the retail units on Ground Level is directly to the outside.

The residential floors above (Levels 02 – 18) are served by two fire-isolated stairs discharging at Ground level via fire-isolated passageways directly to the outside. The stairs are provided with air pressurisation systems.

The basement is served by two fire-isolated stairs plus a dedicated stair serving the Substation.

Level 02 comprises of a communal gym, pool, changing rooms and residential apartments. The communal gym, pool and changing rooms are grouped together and fire separated from the common residential corridors. Egress from this communal area is via the residential corridors to the fire-isolated stairs. There is an extended travel distance from the pool area to a point of choice from where two alternative exits are available; the travel distance to the nearest alternative exit also exceeds the maximum DtS permitted distance of 40 m, being ~54 m.

The residential floors 02 – 18 have dead end travel distances of up to 11.8 m (in lieu of 6 m) from the two-key apartments, and overall corridor length in excess of 60 m. Overall corridor length is permitted by the DtS Provisions to be a maximum of 40 m before needing to be divided by smoke separating doors. It is proposed to mitigate these non-compliances by rationalising the number of required smoke doors so that corridor lengths are ~51 m, and providing enhance passive smoke protection (smoke seals to corridor doors) and early warning (supplementary heat detector inside each apartment).

Specific egress related Alternative Solutions which will be developed have been identified as follows:

- Permit on Basement Level 02:
 - Extended travel to a POC of 25 m in lieu of 20 m
 - Permit extended travel to the nearest of alternative exits of 52 m
- Permit on Basement Level 01:
 - Extended travel to a POC of 28 m in lieu of 20 m
 - Loading dock non being fire-separated from the carpark
- Permit on Basement Level 0:
 - Extended travel to a POC of 30 m in lieu of 20 m
 - A non-compliant exit stair
- Permit on Basement Levels an extended distance between alternative exits of 70 m in lieu of 60 m
- Permit on Ground Level:

- Retail units on Ground floor to have a single exit directly to the outside
- Direct connection between Residential lobby and fire-isolated stair
- Permit on Level 02:
 - Skylights exceeding 20% of the roof surface area and being closer than 3 m from the external wall of level 03
 - Extended travel from the pool area to a POC between alternative exits of 24 m in lieu of 20 m
 - Permit extended travel from the pool area to the nearest of alternative exits of 49 m
 - Permit an extended distance of 54 m between alternative exits in lieu of 40 m
 - Allow corridor lengths to be 48.3 m in lieu of 40 m without smoke separation
- Permit on Levels 03 – 17
 - Permit extended travel from the residential units to a POC between alternative exits of 11.2 m in lieu of 6 m
 - Allow corridor lengths to be 50 m in lieu of 40 m without smoke separation
 - On level 16 permit extended travel from the terrace pool area to a POC between alternative exits of 30 m in lieu of 20 m.
- Permit on Level 18
 - Permit extended travel from the residential units to a POC between alternative exits of 11.2 m in lieu of 6 m
 - Allow corridor lengths to be 51 m in lieu of 40 m without smoke separation
- Permit the loading dock and retail tenancies to be without a zone smoke control system
- Permit access to the fire control room to involve a change in level exceeding 300 mm

Fire resistance

The proposed building requires Type A construction due to its height, which is the most onerous with regard to required fire ratings. Owing to the building being sprinkler protected and large areas of the façade being glazed, it is foreseen that the fire rating of element of structure may potentially be rationalised as follows through fire engineered calculations:

- Ground floor (primarily retail) to have 120 minutes fire rating, in lieu of the 180 minutes
- Residential levels 02 – 18 to a fire rating of 60 minutes in lieu of 90 minutes

The above will be justified on the basis that the sprinkler systems are high reliable and that the likelihood of simultaneous failure of the sprinkler system in conjunction with an above average fuel load is highly unlikely. Furthermore, the large glazed areas will improve venting of heat and serve to reduce the severity of a fully involved compartment.

Fire Brigade intervention

Provision for fire brigade intervention is allowed for with internal fire hydrants located in the fire-isolated stairs. A booster assembly will be provided for the combined hydrant / sprinkler system. The location of the booster assembly will be agreed under discussion with Fire and Rescue New South Wales (FRNSW).

A Fire Control Room (FCR) is provided at Ground level with entries directly from the outside and from the residential lobby respectively. The FCR houses the main FIP, Fire Fan Control Panel, EWIS and WIP panel etc. There may be a difference in level between that of the floor of the FCR and the outside, however, this will be address via a fire engineered solution.

The building will be provided with emergency lifts for use by the fire brigade.

Conclusion

The fire engineering strategy will be documented during ongoing design development in accordance with the International Fire Engineering Guidelines and commensurate with international best practice. Fire life safety non-compliances will be addressed in the future FER as alternative solutions by demonstrating compliance with the Performance Requirements of the BCA.

Tel: 8907 0900
Fax: 9957 4127

UNITED
BY OUR
DIFFERENCE

