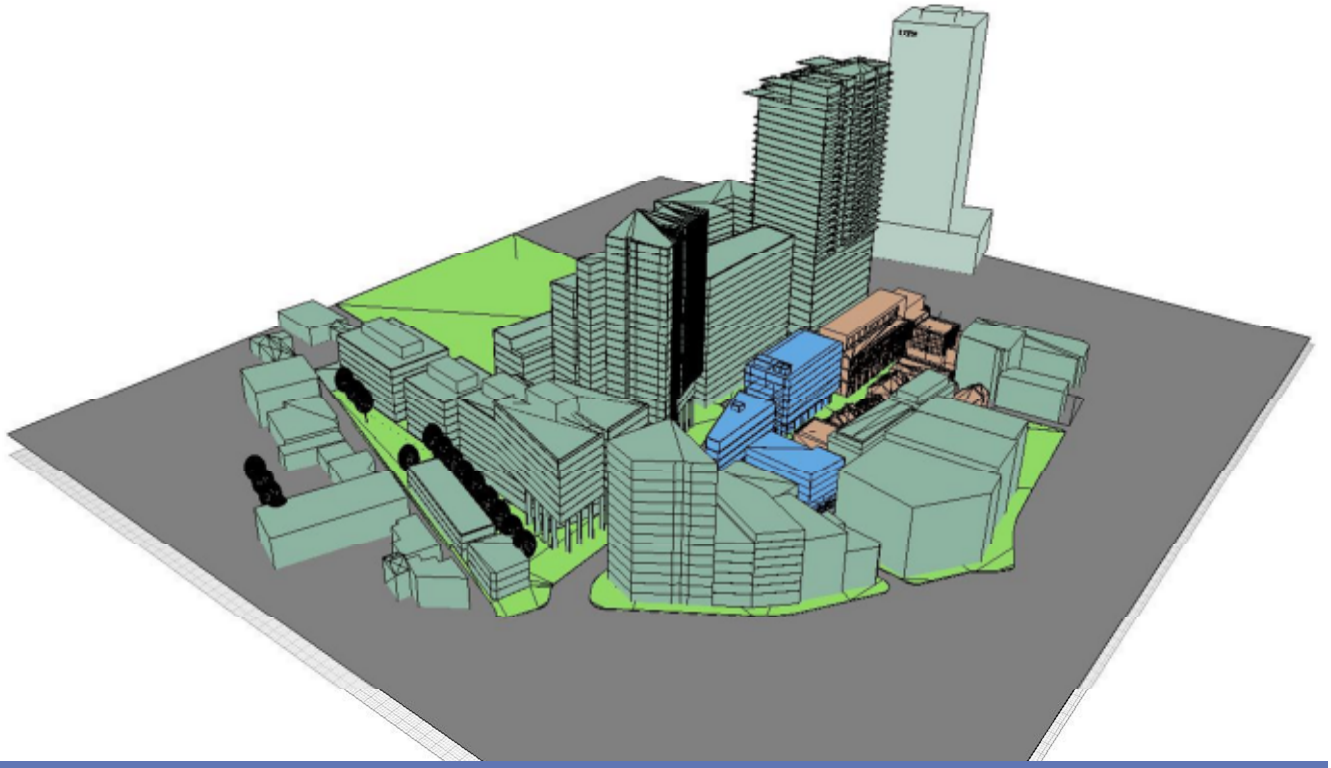

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WSP

KENSINGTON STREET PRECINCT

BLOCK 3b, 3c and 10BLOCKS 3B, 3C AND 10
Building services

Project Application Report

12/04/2012

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Draft	Incorporating comments		
Date	02/04/2012	11/04/2012		
Prepared by	RAB	RAB		
Authorised by	JCO	JCO		
Project Number	SYD1122100	SYD1122100		
Amendments				

KENSINGTON STREET PRECINCT

BLOCK 3b, 3c and 10BLOCKS 3B, 3C AND 10

Building services

Project Application Report

12/04/2012

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Table of Contents

1 Introduction

The Kensington Street Precinct Development

The Kensington Street Precinct Development form part of the former Carlton United Brewery (CUB) site in Chippendale, NSW, now known as Central Park.

The site runs along Kensington Lane and is bounded by Broadway to the north, Carlton Street to the west, Outram Street to the South, and Goold Street to the east.

Blocks 3b, 3c and 10 Development

These blocks forms part of the Kensington Street Precinct within the Central Park development in Chippendale, Sydney, NSW as described in the previous section.

The project involves the construction of an 8 level (Block 3b), 6 level (Block 3c) and 6 level (Block 10) student accommodation development, designed by Tonkin Zulaikha Greer architects. Blocks 3b and 3c are joined via a link building. The buildings will incorporate ground level retail areas with student accommodation on the remaining buildings levels. Block 10 will utilise existing façade on the site and comprise a new build storey addition above.

The development also makes use of low carbon and reduced waste opportunities available from the overall Central Park development, as described in the following section.

The design objective is to provide a facility which will optimise, within appropriate commercial constraints, the opportunities for the reduction in the use of energy and water. The design will aim to reduce electricity consumption, which has a significant negative greenhouse gas implication through the use of coal for electricity generation. Water usage in the building will also be minimised as it is a scarce resource.

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

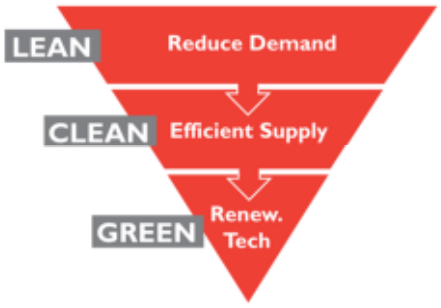
All building services systems will be designed to meet the Building Code of Australia and relevant associated Australian standards that are current at the time of this report.

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.
- T5 efficient fluorescent lighting system with zone switching to reduce electricity consumption.

Precinct Approach

The adjacent Central Park Development precinct design has followed the Lean, Clean and Green energy hierarchy, which prioritises energy reductions first through passive design and energy efficiency measures, then through large scale implementation of low carbon technologies such as the introduction of onsite generation through Tri-generation.



This three-step process follows a common sense approach and understands the cost of carbon abatement through technology application, i.e. the hierarchy represented in the figure describes the most cost effective route to support the resource consumption aspirations for the wider Central Park precinct.

Each building is to target a minimum 5 Star Green Star standard as well as the incorporation of site wide initiatives of a central thermal plant and central water recycling plant. The development of the Kensington Precinct Street will emulate site wide environmental initiatives, but will not specifically target a Green Star rating, as due to the space use mix and spatial differentiation of the blocks, the buildings do not meet the eligibility criteria of any pre-existing Green Star tools.

Centralised Utilities Provided at Central Park

Tri-generation plant will be installed on the site to produce 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 hot water is to be reticulated to the Kensington Precinct Block 3b, 3c & 10 buildings where heat exchangers will allow each building to make use of the services provided by the Central Thermal Plant. 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 buildings heating loads are to be provided by the Central Thermal Plant.

The central recycled water treatment plant is to consist of a 1,000kL recycled water plant. The recycled water treatment plant is to utilise sewer mining to treat blackwater to a Grade A standard. This non potable water will be reticulated to each building to serve all of the non-potable demands. Mains water will also be reticulated to each building to serve all potable demands.

The development of the Central Thermal Plant will emulate site wide environmental initiatives described in the previous section.

Green Star Rating

The Block 3b, 3c and 10 building design will not specifically target an official Green Star rating due to the absence of an as an appropriate rating tool based on the specified building usage.

The design will however follow the specified 5 star Green Star principles as a minimum level of performance for the building design in order to emulate site wide building design performance and environmental initiatives.

2 Mechanical Services

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

- Building Code of Australia 2011
- AS/NZS 1668.1-1998 and AS/NZS 1668.2-1991
- City of Sydney Council Requirements
- AS 3666-2002
- AS/NZS 3000-2007

The student accommodation shall be provided with local wall mounted air conditioner units which shall be directly ducted to outside through the perimeter wall. These shall be provided to each dwelling and complete with local controls.

Lobbies and corridors are proposed to be naturally ventilated. Where this is not possible a preconditioning unit located on the roof shall supply tempered air to the corridors via a riser shaft from the roof. Common areas shall be provided with ducted fan coil units supplied with roof mounted DX units

Separate toilet exhaust systems shall be reticulated from each apartment to local central systems discharging at roof level. Each bathroom shall be ventilated by the central toilet exhaust fan. Make-up air shall be by natural means. Apartment owners are expected to open a window or door when the exhaust systems are operating.

A motorised damper for each individual apartment system shall be opened and closed via the light switches in the toilets and laundries with run on timers. Each central riser shall have a variable speed fan modulating based on the pressure within the duct.

Each apartment and the corridors shall be naturally ventilated via opening windows and/or doors.

Central garbage exhaust systems for each building core with fans mounted on the roof, discharging vertically.

Mechanical ventilation systems shall be provide for Switch Rooms, Plant Rooms, Communications Rooms, Sprinkler pump room, sprinkler valve chamber room and other plant rooms.

The retail tenancies will be provided with facilities to connect the tenancy to a roof mounted DX unit. Each retail tenant will have the ability to connect packaged air conditioning units to the systems as part of their fit out through dedicated space within a riser shaft.

Provisions have been made to allow for commercial kitchen exhaust as well as provision for toilet exhaust via risers to the roof.

All supply and exhaust ventilation systems will incorporate variable speed fan drives, fan start/stop will be controlled by adjustable room temperature and/or time clock as appropriate so as to operate as little as possible, without loss of amenity in the spaces served.

A Building Management System is proposed based on direct digital controls (DDC) for common area mechanical services to which the items of mechanical plant can be interfaced, controlled and monitored. The system shall be administered by an operator workstation located in the operator's office.

In summary, the mechanical systems are appropriate, energy efficient systems, employing some of the latest low carbon technologies commercially available.

3 Electrical Services

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

- Building Code of Australia 2011
- City of Sydney Council Requirements
- AS/NZS 3000
- AS/NZS 1680.0
- AS/NZS 1768
- AS 2293.1-2005
- Energy Australia Requirements

The building will be supplied at Low Voltage from an Ausgrid connection. The supply shall be presented within the main switch rooms which will be located at grade level within Block 3b, serving Block 3b and 3c and Block 10.

The supply shall be configured to provide essential and non-essential loads. Standby diesel generator shall not be provided.

Retail tenancies will be provided with separately metered electrical supplies.

Sub-mains will be run horizontally through the levels and underground conduits to meet electrical risers where they shall reticulate vertically to the floors above.

An energy metering and monitoring system will be provided for monitoring and reporting on the energy usage of the buildings in line with the requirements of Green Star.

The student accommodation areas are provided with high efficiency light fittings generally utilising T5 fluorescent lamps or compact fluorescent lamps with electronic ballasts which will reduce the electrical consumption when compared to light fittings utilising T8 lamps.

Back of house areas and amenities areas will be provided with light fittings utilising either linear T5, T8 or compact fluorescent lamps with electronic ballasts as required to suit the particular area.

Occupancy sensor controls and local switching will be used for back of house and amenity areas to suit the usage.

External lighting will be provided around the buildings 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. An allowance shall be made for externally illuminated signage.

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

4 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/ACIF S008
- AS/ACIF S009

The communication infrastructure will be of Fibre-to-the-Premises type and thus fibre cables will be used along external lead-in path to MDF 'room', vertical cabling from MDF room to risers, and horizontal cabling from risers to the Optical Network Terminal (ONT) at accommodation units.

For the retail units, a dedicated ONT shall be provided off the fibre backbone to provide communication connectivity for the retail tenants.

An access control and intruder detection system shall be provided to control the access of areas within the building to appropriate persons, and restrict entry of unauthorised persons into the building.

CCTV monitoring will be provided to building entry / exit points and internal / external communal amenity areas.

5 Hydraulic Services

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

- Relevant Australian Standards
- Building Code of Australia 2011
- NSW Plumbing & Drainage Code of Practice
- Sydney Water Corporation Requirements
- City of Sydney Council requirements
- Gas authority requirements
- Green Building Council of Australia

Appropriately sized new sewer connections will be made to the sites infrastructure and also Sydney water infrastructure in Balfour Street.

Trade waste treatment will be provided to treat any trade waste generated from commercial/retail premises within the Brewery Yard. Treated trade waste will drain to the sanitary drainage system.

A New potable cold water service connection will be established from Sydney Water's infrastructure. Cold water pump sets will be provided to reticulate cold water as and if required. In addition to the authority meter, private sub-meters will be installed to monitor the water usage of individual building uses.

Non Potable Cold Water (NPCW) service connections will be extended from site infrastructure to serve non-potable water uses within the block (sanitary flushing and washing machines). Local pump sets shall be provided to boost the NPCW water as required.

A domestic hot water heat exchanger and storage vessel together with a flow and return system will be located within a hydraulic plant area. The heat exchanger will be powered from site infrastructure district heating supply.

Metered gas services will be provided to the retail zones to facilitate authority metering as required by the gas authority.

Rainwater from all roof areas will be collected and harvested within local retention tanks for transfer to recycled water treatment plant for non-potable re use within the development.

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

- Toilets to be 4 Star WELS rated or better
- Taps to be 6 Star WELS rated or better
- Showers to be 3 Star WELS rated, flow rate 7.5L/min max.

6 Vertical Transportation Services

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

- AS 1735.1/2/12
- AS 1428.1
- Building Code of Australia 2011
- City of Sydney Council Requirements
- Property Council of Australia Premium and A Grade Requirements
- AS/NZS 3000
- Occupational Health & Safety Requirements
- ISO 9001

Two Passenger lifts shall serve Block 3b and 3c and one Passenger lift shall serve Block 10. The lifts shall service the student accommodation elements only.

The internal transportation needs of the residential buildings involve low volume passenger flows, and access for residents and visitors including people with disabilities.

The primary strategies adopted for the design of the transportation services include:

a) Passenger lifts designed to handle passengers and residential type goods;

a) Deep lift cars to assist in the transfer of goods, e.g. beds, tables, etc;

b) Machine Room-Less type lifts to negate the need to build a lift machine room;

c) Energy efficient drive and control systems;

d) 24 hour lift availability providing access to all floors for people with disabilities;

e) Equipment design to allow for the safety, comfort and health of users and personnel working on the lift equipment; and

f) Main entry level located at Ground floor.

Conventional group control will be utilised for all the passenger lift groups serving the building. The control system will be able to interface with local security requirements to control access to the apartment floors in each building. All lifts will have the capability for CCTV monitoring.

One lift within each building shall be able to serve as an emergency lift in accordance with BCA requirements.

All lifts will be compliant with AS 1735.12 and AS1428.1/2 with regards to access for people with disabilities.

Energy efficient lighting will be used in all lifts to minimise energy consumption. Passenger lifts in each building will also be provided with the ability to feed back 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 BMS and security requirements.

7 Fire Services

Fire services for this building will be provided in accordance with the National Construction Code, relevant Australian Standards, and WSP Fire Engineering Brief (ref: FES110140E, Rev 1 dated 15/12/2011).

Services shall include:

- Smoke Detection and Alarm System
- Smoke Hazard Management System
- Building Occupant Warning System
- Fire Sprinkler System (drenchers only)
- Fire Hydrant System
- Fire Hose Reel System
- Portable Fire Extinguishers

Design Criteria

The Design Criteria forming the basis of the Fire Services design will comprise:

Fire Services System	BCA requirement	Australian Standard
Smoke Detection and Alarm System	NCC Spec E2.2a Clause 3	AS1670.1-2004
	NCC Spec E2.2a Clause 4	AS1670.1-2004
Building Occupant Warning System	NCC Spec E2.2a Clause 6	AS1670.1-2004
Fire Sprinkler System (drenchers)	NCC Spec E1.5	AS2118.1-1999
Fire Hydrants	NCC Spec E1.3	AS2419.1-2005
Fire Hose Reels	NCC Spec E1.4	AS2441-2005
Portable Fire Extinguishers	NCC E1.6	AS2444-2001

Smoke Detection and Alarm System

An analogue addressable looped smoke detection system will be provided throughout each building for fire detection, and building services shutdown. An analogue addressable Fire Indicator Panel provided at the main designated building entry lobby to Block 3B and to Block 10 and will be connected to an approved monitoring company to notify fire brigade in the event of a fire alarm. Both fire panels will be interfaced with status notification only.

Addressable smoke detection will be provided throughout common areas of the building, with thermal detectors provided within the entry of the sole occupancy units, and smoke alarms provided in the sleeping areas.

Interface will be provided with other services as follows;

- security system for monitoring and release of locked doors in egress path.
- building occupant warning system for controlled evacuation of building occupants.
- mechanical services system for system shut down upon fire alarm.
- fire sprinkler system (drenchers only) for monitoring of isolation valves, pumps, and system activation.
- fire hydrant system for monitoring of isolation valves and pumps.

Building Occupant Warning System

A building occupant warning system will be provided throughout each building to allow controlled evacuation of the building during a fire condition.

Occupant warning speakers will be provided throughout the building, located to emit a pre-recorded verbal evacuation message at the required sound pressure level to all occupied areas.

Visual Alarms (Strobes) will be provided in areas with high ambient noise level, and to any areas specified for use by hearing impaired occupants.

Break Glass Alarms (BGA) will be provided throughout the building adjacent to required exits.

Interface will be provided with Smoke Detection and Alarm System.

Fire Sprinkler System (drenchers only)

Fire sprinkler protection will be provided to glazed openings in walls surrounding the egress stair lobby between Blocks 3B and 3C.

The drencher heads will be 15mm 68degC fast response Tyco model TY3488 vertical sidewall type window sprinklers, and will be installed in accordance with Tyco data sheet TFP620, dated September 2011.

The sprinkler system will be supplied from the hydrant system supply, with the fire services water supply connection and booster pump sized to meet the maximum system demand of both systems operating simultaneously. A single connection to supply the sprinkler system will be made to the hydrant system pipework immediately after the booster pump, and will be provided with a monitored isolation valve and a flow switch to monitor sprinkler system activation.

The sprinkler system demand will be calculated as specified in the Tyco Data Sheet TFP620, at 76L/min minimum flow per head @ 120KPa for sprinklers spaced at 1.83m to 2.44m, and 57L/min minimum flow per head @ 120KPa for sprinklers spaced at less than 1.83m.

Portable Fire Extinguishers

Portable fire extinguishers to suit the relevant risk and associated signage will be provided throughout all areas of the building. Additional extinguishers will be provided within 10m of the entry to each sole occupancy unit on residential levels, in lieu of fire hose reels.

Fire blankets will be provided to all kitchen areas and similar risk areas.

Fire Hydrants

Fire hydrant coverage will be provided throughout each building, with a brigade booster enclosure provided at ground level within sight of the main building entry.

Fire Hydrant coverage will be achieved by ensuring all areas of the building can be adequately reached with a 30m hose length and 10m nozzle spray from a fire hydrant outlet. Additional hydrants will be provided on floors where adequate coverage can not be achieved from hydrant outlets in the fire stairs.

A dedicated water supply will be provided, comprising a 150mm dia connection to the towns main supply in Kensington Street.

An automatic diesel booster pump will be provided in a dedicated fire services pump room within each building. The pumps will be sized to provide 5L/sec flow and 700kPa residual pressure at the two most disadvantaged hydrant outlets, as required for a system utilising on-site booster pumps. The booster pump will supply both the sprinkler and hydrant systems, and will be sized to meet 150% of the maximum combined demand of both systems.

Fire Hose Reels

Fire Hose Reel coverage will be provided through ground level of each building. Hose reels are not required on residential areas as stated within the fire engineering section of this report.

Hose Reels will be provided to ensure all areas are reached with a 36m hose and 4m of nozzle spray, and to ensure hoses are not required to extend between fire compartments.

The Hose Reel system will be supplied from the metered domestic water supply connection to the building.

Hose Reels will be supplied with a 19m dia x 36m long hose, and will have a minimum of 0.33L/sec flow at the two most disadvantaged Hose Reels.

8 Fire Safety Engineering

The following key non-compliances with the Parts C, D and E of the BCA, as they relate to fire life safety, have been identified at this stage:

Item	Description of non-compliance	DtS Provision	Performance Requirement
All Blocks			
1	Permit the FRL of the Ground Level retail tenancies and garbage storage rooms to be 120 minutes in lieu of 180 minutes and 240 minutes respectively	C1.1	CP1, CP2
2	Allow 150 mm diamater non-fire rated penetrations in spandrels	C2.6	CP2
3	Permit the hydrant booster assembly to be located within 2 m horizontally of unprotected openings	E1.3 (AS2419.1)	EP1.3
4	Permit the removal of fire hose reels from student accommodation levels areas with provision of fire extinguishers in lieu	E1.4	EP1.1
5	Permit domestic smoke alarms and addressable heat detectors to be installed within the student accommodation units in lieu of addressable smoke detection	E2.2	EP2.1, EP2.2
Blocks 3B & 3C			
6	Permit a single means of escape from the basement (Ausgrid substation) which has a floor area greater than 50 m^2	D1.2	DP4
7	Permit the path of travel to a fire-isolated exit to be via a non-fire-isolated stair	D1.9	DP5, EP2.2
8	Permit a Class 7b bike storage to be included in the Class 3 fire compartment Permit a door in a firewall to be unrated and drenched in lieu of a FRL of -/120/30 Permit the travel distance between exits to be c. 51 m in lieu of 45 m. Permit a non-required non-fire-isolated stairway to connect 8 levels	C1.1, Spec C1.1 C3.5 D1.5 D1.12	CP1, CP2 CP2 DP4 CP2, DP4
9	Permit a non-compliant atrium to connect Levels 1 - 7	G3.2, Spec G3.8 Clause 2.1	CP2, DP4, EP1.4, EP4.3
Block 10			
10	Permit extended travel distances of up to 13 m from SOU's to an exit in lieu of 6 m and 21 m from the common room in lieu of 20 m	D1.4	DP4, EP2.2

Pursuant to Clause 144a of the EP&A Regulation 2000, the assessments undertaken are expected to demonstrate that the aforementioned Alternative Solutions meet the relevant Performance Requirements of the BCA subject to the following:

- Retail occupancies and garbage rooms on the Ground floor of Blocks 3B, 3C and 10 to achieve an FRL of 120 minutes.
- Spandrels are permitted to extend less than 600 mm above the upper surface of the intervening floor. Note that the required total separation height of 900 mm must still be achieved.
- Provide smoke lobby to the Block 3B basement including medium temperature smoke seals to the fire door and smoke door.
- Provide fire separation to the central compartment in Block 3B and 3C using Tyco Window Wetting Sprinkler System including doors to the inside (central internal stair side) only.
- Provide automatic smoke detection system throughout all areas in accordance with BCA Specification E2.2a and AS 1670.1 modified in Residential units as follows:
    - Provide Type A combination rate-of-rise and fixed temperature heat detectors in each Class 3 unit within 1.5 m of the door, connected to the fire alarm panel.
    - Provide smoke alarms to BCA Specification E2.2a Clause 3 to all units
- Provide Occupant Warning System in accordance with AS 1670.4. An SSISEP is not required to be installed in any building.
- Provide permanently open louvres in Block 10 for corridor ventilation (or mechanical / auto-opening alternative). Extent to be confirmed in developed design.
- Provide medium temperature smoke seals to unit doors and risers in corridors in all Residential areas
- Provide fire hydrant system designed and installed in accordance with BCA Clause E1.3 and AS 2441 except booster assemblies are permitted to be within 2 m of unprotected openings on the Ground floor.
- Fire hose reels are not required in Residential areas
- Hazard specific portable hand held fire extinguishers to be provided in residential areas distributed to serve only the storey at which they are located; and so that the travel distance from the entrance doorway of the sole-occupancy unit to the nearest extinguisher is not greater than 10 m. Extinguishers elsewhere to be provided in accordance with BCA Clause E1.6 and AS 2444.

These non-compliances will be the subject of fire engineered Alternative Solutions which are being developed in accordance with the International Fire Engineering Guidelines. The installations required as part of the Alternative Solutions have been advised to the design team and incorporated into the relevant services design where appropriate and will be updated as the design progresses.

These proposed Alternative Solutions have been presented to FRNSW for discussion and they have given preliminary feedback on technical and operational aspects of the fire safety engineering and building design.

9 Summary

WSP has been appointed to provide building services consultancy services for the proposed developments known as Blocks 3B, 3C and 10 on the Central Park Development site in Sydney, NSW

This report has addressed the required services inputs in to the development in accordance with the relevant responsible authority criteria and the client's requirements.

As such the proposed development of Blocks 3B, 3C and 10 on the Central Park Development site is considered appropriate from a building services aspect.

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