Garvan Institute

Garvan St Vincents Campus Cancer Centre

Building Services Project Application Report

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Contents

1 EXECUTIVE SUMMARY

The following summarises the key features of the building services for the proposed development:

Hydraulic Services:

- Separate dedicated water metering & separate dedicated supplies to new building;
- New sewer connections to the Sydney Water main, subject to the requirements of Sydney Water;
- Roof water retention and reuse for flushing WC's & Urinals and irrigation;
- **** rated fittings;
- 4.5/3 'Smartflush' Pans
- Hydraulic services installation to AS/NZS 2419.1994, AG601, NSW code of practice for Sanitary Plumbing and Drainage, BCA, Sydney Water Corporation, local Council regulations and manufacturers requirements.
- New natural gas connection to the existing gas main which is understood to be in Victoria Street, although yet to be confirmed.

Fire Services:

- Separate standalone systems to serve new building;
- Sprinklers will be provided where dictated by the fire engineered solution.
- New fire water supply from Victoria Street water main
- Fire Control panels, EWIS, smoke detection, and dry fire services.

Electrical Services:

- Power supply will be fed from the proposed new basement chamber substation(s) within the new GSVCCC development, via the main switchboard in the GSVCCC;
- New stand alone main switchboard will be provided;
- New standby diesel generator for emergency power provision;
- Separate metering of house light, small power and plant;
- High efficiency T5 lamps & electronic ballasts with opportunity for dimming to perimeter zones will be considered;
- Interior lighting to AS1680, compliance with BCA;
- Exterior lighting to AS1158:3.1:2005/Amdt 1 and AS4282:1997;
- Computer monitored emergency and exit lighting system and luminaires to AS2293.1:2005;
- Electrical services installation to AS3000:2007

Mechanical Services:

- Chilled water air handling unit/ Fan coil unit system with majority of plant located in dedicated roof plantroom;
- Variable speed drives to pumps and fans where appropriate;
- Variable speed fume cupboard exhaust fans except where not possible;
- Mixed mode air conditioning to write up areas and consultation rooms will be considered;
- Outdoor air economy cycles will be provided, except where the specific laboratory requirements dictate otherwise;
- Night purge will be considered;

- Air conditioning systems to shut down on fire signal except where the fire engineered solution dictates otherwise.
- Ventilation systems to AS1668.1:1998 , AS1668.2: 2000 &1991, compliance with BCA,

Vertical Transport services:

- 5 no. new lift, subject to design options;
- Machine room-less lifts will be considered to minimise plant space;
- Compliance with BCA, AS1735, AS1428.2, AS4431
- Emergency lifts will be provided to the requirements of the fire engineered strategy

2 INTRODUCTION

Arup has been commissioned by both the Garvan Institute and St Vincent's Hospital to provide a mechanical, electrical, hydraulic, fire and lift services design for the new GSVCCC located in the St Vincent's Research Precinct on Victoria Street, Darlinghurst, Sydney.

This document describes the key features of the building services for the purposes of Project Application submission.

3 BUILDING FORM

The building is a new eleven (11) storey medical facility building and provides five (5) levels of basement carparking.

The building generally comprises consultation areas and research laboratories. Research laboratories are to be designed to PC2 levels.

Dedicated plant area will be allocated on an upper floor with additional plant areas within lower floors and on the existing Garvan roof.

4 HYDRAULIC SERVICES

4.1 General

The design will be in accordance with relevant design codes including: AS/NZS 3500 all sections, AS 5601, NSW Code of Practice for Sanitary Plumbing and Drainage, BCA, Sydney Water Corporation, Australian Standards, Local Council regulations and manufacturers requirements.

4.2 Domestic Cold Water

A new 100mm water connection will be required to the authorities water main in Victoria Street. A water meter assembly and building backflow prevention device (RPZD) will be located within the fire booster assembly and will be monitored by the BMCS system.

A variable speed coldwater pump set will be located in a combined fire and coldwater services pump room on level 3. Potable coldwater will be provided to each level with pressure reduction valves utilised on the lower levels to ensure supply pressures do not exceed 500kPa.

The coldwater supply will generally be supplied vertically via a number of service riser ducts providing water to all areas of the building while minimising horizontal pipe reticulation. Each riser duct will have isolation valves to facilitate maintenance shut downs.

Back flow protection (RPZD Valves) will be provided to all laboratories to ensure cross connections do not occur between the laboratories and the potable water supply. Each laboratory eyewash/safety showers and wash basins will be provided with potable pressure stabilised supply. RPZD valves will be located within the laboratories in a recessed stainless steel box with an inbuilt tundish drain. Isolation valves will be provided to all laboratories within the RPZD valve box for the non-potable supply and within the thermostatic mixing valve box for the potable water supply.

Potable water will also be supplied to the staff amenities public amenities, cafe, consulting room wash basins and all other potable fixtures.

4.3 Domestic Hot Water

A gas fired potable hot water system to supply the building will be located in roof plant room. Solar preheat will be considered in conjunction with other solar initiatives.

A circulating hot water service will be provided to the building with a dual hot water circulating pump set located in the roof top plant room. Hot water will reticulate to the building by a number of service riser ducts providing water to all areas of the building while minimising horizontal pipe reticulation. Each riser duct will have isolation valves to facilitate maintenance shut downs.

Back flow protection (RPZD Valves) will be provided to all laboratories to ensure cross connections do not occur between the laboratories and the potable hot water supply. Each laboratory wash basins will be provided with potable warm water supply. RPZD valves will be located within the laboratories in a recessed stainless steel box with an inbuilt tundish drain. Isolation valves will be provided to all laboratories within the RPZD valve box for the non-potable hot water supply and within the thermostatic mixing valve(TMV) box for the potable hot water supply.

Potable hot and warm water will also be supplied to the staff amenities, public amenities, canteen, consulting room wash basins and all other potable fixtures. All pipework will be insulated to minimise heat loss, this is to include pipework up and down stream of TMV's. Insulation will be 25mm of foil faced mineral wool.

Warm water will be provided by thermostatic mixing valves housed in recessed stainless steel wall boxes which incorporate hot and cold water isolation valves.

4.4 Fixtures and Fittings

The building will be upgraded with water saving outlets and appliances for water and energy savings as follows:

Wash basin taps – 5 Star

WCs – 4 Star 3 litre half/4.5 litre full flush

Urinal – 6 Star smart flush

The sanitary fixtures and tapware will be selected by the Architect to meet those Water Efficiency Labelling and Standards (WELS) ratings.

Water flow restrictors will be provided to all tapware and fittings to limit water consumption.

4.5 Stormwater and Roof Water Drainage System

There is stormwater drainage existing in Chaplin lane and it is intended to connect the buildings stormwater drainage to this drain. This is subject to authority approval.

Stormwater drainage to the building will be comprised mainly of roof water and pavement water from the front and rear of the building. Roof water will be directed to rainwater tanks located in the roof top plant room with overflows directed to the level 2 aerial stormwater system.

The site will be greater than 1000m2 and, subject to authority approval, detention is not currently proposed to provide On Site Detention (OSD), due to the proposed rainwater harvesting scheme and no increase in impervious area to the site.

Proposed materials for stormwater drainage will be:

In ground - polypropylene, concrete;

Above ground – HDPE.

Trench drains will be provided at building entries to eliminate water ingress to the building. A pit and pipe stormwater system will be installed to the lowest basement car park level and will drain to a stormwater pump station which will pump out to the gravity stormwater drainage system.

4.6 Sewer and Sanitary Plumbing System

It is proposed to connect sanitary drainage from the building to the existing 225mm diameter authorities sewer drain within Chaplin Lane. An aerial drainage system compliant with AS3500 will be installed to reticulate to the base of all sanitary plumbing risers. Sanitary drainage from lower car park levels will be captured by a sewer pump station and pumped out to the gravity drainage system. Consideration will be give to proving HDPE material pipework in lieu of PVC.

A fully vented modified sanitary drainage system designed to comply with AS3500 will be installed to the building as this will offer more flexibility to the design of the system. The sanitary drainage stacks will be separated into:

- Toilet stacks and kitchenette stacks draining directly to the sewer system;
- Laboratory Stacks draining to a dilution/stabilisation pit;
- Cafeteria stacks draining to a grease arrestor;

Material to be used for sanitary drainage:

- Laboratory and toilet stacks HDPE or polypropylene if high temperature discharge;

- Grease stacks HDPE.

Pipe work design concept will utilise multiple vertical pipe work stacks to minimise horizontal pipe as this increases flexibility for future alterations.

An above ground grease arrestor will be provided subject to the inclusion of a café or similar area. A dilution pit will also be required to treat laboratory waste.

The exact configuration of the trade waste systems will be dependant on the constituents within the waste.

4.7 Rainwater Harvesting System

Rainwater harvesting will be provided to the building and it is intended to harvest water from the concrete roof.

A drainage system will be installed to the roof plant room to enable rainwater to be harvested from all areas of the roof. The system is likely to be syphonic however will be developed at design development stages. A rainwater tank of approximately 50,000 litres is proposed to catch and store the rainwater within the roof plant room. The system will be designed for yearly rainfall intensities to ensure the system is regularly flushed.

A non-potable water pump set will be installed adjacent to the rainwater tank with a potable water automatic change over device to ensure continuous flow during periods of low rainfall.

The non-potable rainwater supply will provide water supply to the WC's and landscape irrigation if required.

Materials for non-potable water supply will be:

- Duct risers and reticulation pipework - 316 stainless steel crimped pipe and fittings
- Laboratory and in wall pipework – Cross linked polyethylene and fittings

Overflows will be required for the syphonic system and preferably will be provided through the parapet of the concrete roof. The overflows from the rainwater tank will be directed to the stormwater system at level 2 ceiling for discharge to kerb gully pit in the Chaplin lane stormwater system.

Roof overflows will be designed to handle a 1 in 100 year ARI storm events (intensity of 270 mm/hr).

4.8 Natural Gas Supply

All gas fitting and natural gas installation will be carried out to AS5601, Gas Supply Authority Recommendations and AGA approvals.

A natural gas supply will be delivered to the building for mechanical plant, hot water heating and laboratory use. An application will be made for a tapping to be made to the authority natural gas supply main.

The system will incorporate a footpath shut off isolation valve with a spare valve key located in the gas meter room. Property isolating valves will be utilised before and after the meter along with, filters and regulators. The meter will be supplied by the gas authority and fixed in the gas meter position at the property boundary.

Gas flues from hot water heaters and boilers will extend through the roof to terminate to atmosphere. All rooms containing gas-burning appliances will be adequately ventilated.

5 FIRE SERVICES

5.1 General

The proposed building will be more than 25 meters in height and will require grade 1 water supplies for the fire sprinkler and fire hydrant systems. A fire control room will be required if the building height exceeds 50 meters in accordance with BCA close to the main fire brigade access to the building.

Systems will include

- Fire hydrants
- Automatic Fire Sprinklers
- Automatic fire detection and alarm system
- A Sound System and Intercom System for Emergency Purposes (SSISEP)

5.2 Fire Hydrants

A fire hydrant service will be provided to satisfy requirements of the Building Code of Australia, AS 2419 and the local fire brigade requirements.

It is proposed that a new connection will be made to the authority's water main in Victoria Street which will extend to the Fire hydrant booster assembly located within a recessed cabinet in the Victoria street façade. As the building is more than 25 meters in height, subject to detailed design, a 25,000 litre fire hydrant storage tank will be located within a combined fire and hydraulic services pump room located on level 3 and duplicate diesel/electric pumps sets will be located adjacent to the fire hydrant storage tank to provide the required test pressures to satisfy AS 2419. The fire hydrants will be located within the fire stairs, and the fire stair hydrant risers will be linked at the roof and basement levels to form a ring main.

Test water from the fire hydrant system will be directed on to roof and recycled to the rainwater tank.

5.3 Fire Hose Reels

A fire hose reel service will be installed to satisfy BCA requirements, AS 2441, AS3500 and local government requirements. Each fire hose reel will take off from the potable cold water service.

Subject to the fire engineering solution fire hose reels will be located within 4 meters of required fire exits and as required to provide effective coverage for fire fighting operations.

5.4 Automatic Sprinkler System

The building is more than 25m in height and will require sprinklers. An automatic sprinkler system will be installed throughout the building to satisfy requirements of the fire engineering brief and AS2118.1. The sprinkler system will be provided with a separate connection to the authorities' water main in Victoria street and a fire booster assembly in a BCA compliant recessed cabinet within the Victoria street façade. Diesel/electric fire sprinkler booster pumps will be located within the combined fire and hydraulic pumproom. A sprinkler tank (notionally 75,000 litres, subject to fire engineering requirements) will be mounted in the roof plant room and will provide a grade 1 supply to the fire sprinkler system.

Flow switches will be provided to each level and at separate compartments. Their test drains will be directed to the fire hydrant storage tank. Fire sprinkler test water will be recirculated through the fire hydrant storage tank adjacent to the fire sprinkler booster pumps and this will eliminate test water wastage during periodic testing. Tank connections

will be provided to the fire hydrant storage tank for testing purposes and normally closed valves will provide water supply to the fire sprinkler system during periodic testing.

5.5 Automatic Fire Detection and Alarm System

An automatic fire detection and alarm system will be provided to satisfy the Building Code of Australia, AS1670 and the local government requirements.

The automatic smoke detection and alarm system will protect the whole of the building and associated facilities for smoke hazard management control.

The automatic fire and smoke detection system will have a main microprocessor type FIP located in the ground floor lobby capable of operating a distributed and or multi loop network of conventional and or analogue addressable smoke and heat detectors and other ancillary devices.

Heat detectors will be provided in areas not suitable for smoke detectors.

The smoke hazard management system will interface with essential services equipment via the main FIP fire fan control module located in the foyer or accessible by ground floor access.

Smoke detection will be provided outside each fire stair in all areas and will interface with any required stair pressurisation system(s).

5.6 Portable Fire Extinguishers

Portable fire extinguishers will be provided to satisfy clause of the Building Code of Australia, AS 2444 and local government requirements.

Generally fire extinguishers will be distributed throughout the building in areas of specific hazard and will be selected according to hazards.

Fire extinguishers in public areas will be in fire hose reel cupboards.

5.7 Sound System and Intercom System for Emergency Purposes(SSISEP)

A Sound System and Intercom System for Emergency Purposes (SSISEP) will be provided to satisfy the Building Code of Australia. The SSISEP panel will be located next to the FIP in the ground floor lobby.

The system will be interfaced with other essential services, i.e. automatic fire detection and alarm systems and smoke hazard management controls including provision of a remote PA system console in a designated security area.

Speakers will be provided throughout all areas of the building as surface mounted speakers' fittings with horn speakers in the car park and plant room areas.

Break glass stations will be connected to the SSISEP system.

5.8 Distribution Piping and Wiring Systems

The fire services and life safety distribution piping and wiring systems will be coordinated with the architectural design and all other services to follow set services routes throughout the complex to conceal services wherever possible and minimise any access for maintenance and servicing.

5.9 Passive Fire Protection

All fire services passing through any walls, floors and ceilings required to have a fire resistance level (FRL) rating will be sealed with approved passive fire protection systems to satisfy the Building Code of Australia, AS1530 and Local Government requirements.

6 VERTICAL TRANSPORT SERVICES

6.1 General

Three (3) new passenger lifts and two (2) goods lifts will be provided to meet the anticipated demands and quality of service for a medical research facility.

The lift configuration will be divided between 2 individual cores:

Core 1 – Staff & Public Passenger Lifts

Core 2 – Back of House Goods Lifts

6.2 Lift Type

In order to minimise the impact headroom and machine room spatial requirements all lifts are proposed to be Machine-roomless type (MRL) with a maximum speeds between 1.6mps and 2.5 mps.

6.3 Sustainability

The lift installation will be designed to deliver an A Grade level of service with a minimal environmental impact. All lifts shall ideally include Variable Voltage Variable Frequency (VVVF) motor drives with power regenerative features.

Traditional non-regenerative drives use a series of resistors as the lift decelerates to a stop. This creates a number of inefficiencies a) energy is dissipated as heat b) additional electrical loads required to cool the LMR.

Regenerative Drives feed this energy back into the building internal electrical utility where it can be used by other loads connected to that network. Electrical power is generated when the elevator travel up with light loads, down with heavy loads or during the deceleration process. Energy savings are subject to load, speed, length of runs & traffic patterns with savings being up to 60% of energy used by non-regenerative drives.

6.4 Standards and Regulations

The lift installation will be developed in accordance with the following standards;

- AS1735 Lifts, Escalators and Moving Walks
- AS1735.12 Facilities for Persons with disabilities
- AS 1428.2: Design for Access and Mobility; Part Two: Enhanced and Additional Requirements – Buildings and Facilities;
- AS 4431 Guidelines for Safe Working on New Lift Installations in New Constructions;
- Building Code of Australia
- Other relevant Codes and Standards
- AS/NZ 3000: Electrical Installations (known as the Australian/New Zealand Wiring Rules). Wiring requirements for lift installations;
- AS/NZ 3008: Electrical Installations – Selection of Cables;
- Cable sizes for lift installations.
- AS2982 Laboratory Design and Construction – General Requirements
- AS2243 Safety in Laboratories – Planning and Operational Aspects

6.5 Compliance with the BCA

The capacity of lifts proposed will be larger than those prescribed by the BCA under *"deemed-to-satisfy"* compliance, to accommodate DDA considerations.

6.6 Compliance with the DDA

The recommendation of AS1428 stipulates that the minimum lift car platform size must be 300mm greater in width and depth to that specified by the BCA. The lift car platform for the Staff and Public Passenger lifts will exceed this requirement.

6.7 Maintenance Requirements

All equipment shall be of latest technology with a proven reliability and serviceability under the anticipated traffic loads and environment.

Particular attention shall be afforded to the design and layout of equipment to make provisions for suitable maintenance access in line with safe working practices.

6.8 Acoustics and Sound Insulation

All vertical transportation will be designed to limit noise and vibration.

It is intended that this be developed with the design team and achieved through:

- the use of sensible planning (i.e. locating non-critical spaces adjacent to the lift cores);
- mounting drives, controllers, conduits, trunking and guide rails on special anti-vibration fittings.

6.9 Security

The exact level of interfacing and security provisions to be provided will be determined during the detailed design stage to reflect the security brief. The need for more sophisticated high-level interfacing can be considered further at this time.

In the interim however we anticipate that all lifts will be fully integrated with the building access security control system and include the following provisions where required:

- Have an electronic data key or swipe card reader which allows for individual floors to be secured or released.
- Have allowance for CCTV cabling within the lift car trailing cables

7 ELECTRICAL AND COMMUNICATION SERVICES

7.1 General

The design of the electrical and communications services will be focused on achieving the following objectives:

- Electrical Services to satisfy the functional requirements of each area.
- Electrical Services to be of an appropriate standard
- Electrical Services to be designed so as to provide a high level of flexibility.
- Design to minimise running and maintenance costs.

7.1.1 Design Criteria

- Electrical Services to comply with the Building Code of Australia.
- Electrical Services to comply with current Australian Standards where applicable and particularly the following.

AS 3000	SAA Wiring Rules
AS 1680	Interior Lighting
AS 1158	Pedestrian Lighting
AS 4282	Obtrusive Lighting
AS 2293	Emergency Evacuation Lighting in Buildings
AS 1136	Low Voltage Switchgear and Control gear Assemblies
AS 3008.1	Electrical Installation - Selection of Cables
AS 3013	Electrical Installations - Wiring systems for specific applications.
AS 1940-2004	The storage and handling of flammable and combustible liquids

7.2 Mains Power Supply

7.2.1 General

Based on an approximate VA per m² assessment, a maximum demand of about 3000A per phase will be derived from a new proposed basement chamber substation which is proposed located on Level 2 of the GSVCCC. This arrangement has to be confirmed with Energy Australia. The high voltage cabling and substation design will be performed by an accredited service provider to Energy Australia standards.

7.2.2 Mains Cabling

The mains cabling from the new basement chamber substation to the new GSVCCC main switchboard will be of fire rated construction, of WS52W rating type-tested in accordance with AS 3013.

7.3 Main Switchboard

A new Main Switchboard (MSB) will be established to receive power from the new basement chamber substation within the building. The MSB will be contained within a Main Switch Room (MSR) of the GSVCCC. The MSR will be fire rated 120/120/120 and will be provided with a suitable system of ventilation and two diverse paths of egress. The MSR will be sized in accordance with AS3000-2000 wiring rules to accommodate the MSB.

The MSB will be a freestanding cubicle type switchboard of Form 3 (minimum) construction, ingress protection rating IP42 and fitted with Air Circuit Breakers and Moulded Case Circuit Breakers to suit. The main bus of the MSB will be rated for 4000A per phase continuous.

The MSB will be constructed to withstand a prospective fault current which will be advised by the Supply Authority.

The MSB will have a master electricity supply authority meter fitted in it with all required devices and accessories.

A section of the main switchboard will be designated for supplying power to the essential services such as lifts, fire alarms, security lighting, power and light within the main switchroom, and other services which may be declared of an essential nature in emergency.

An unmetered section of the main switchboard will be designated for power to retail tenancies with provisions for separate metering.

Automatic power factor correction equipment will be installed to comply with Energy Australia and the NSW service and Installation Rules requirements.

7.4 Standby Diesel Generator

It is proposed that a new standby diesel generation system will be provided to allow on-site power generation to the new development in the event of a mains power failure.

An associated bulk fuel tank will be provided to AS1940.

7.5 Power Distribution

It is proposed that power will be distributed from the MSB as follows:-

- Floor sub distribution boards will be installed in lockable cupboards for each floor to supply the floor light and small power loads including power for workstations and other services.
- Laboratory sub distribution boards will be installed in lockable cupboards for each floor to supply the floor light and small power loads including power for laboratories.
- Plant sub distribution board to supply HVAC system control panel and Water systems control panel.

7.6 Small Power, Lighting, & Emergency Lighting

Adequate small power outlets will be provided in all floors and, where practical, they will be RCD protected.

In laboratories, emergency isolation of all electrical supplies within the laboratory will comply with AS2243.7.

All fixed appliances such as electric stoves, hot water systems, etc, will have the fixed wring terminating in an isolating switch situated close to the unit.

Area lighting will generally be with fluorescent lights which will be selected for easy repairs and maintenance. Lighting levels will be in accordance with the AS 1680.

Lighting systems will utilise high efficiency lamps with a long life. Infrequently accessed spaces will be provided with lighting controls with occupancy detection. These systems will be provided with override switching as appropriate.

Computer monitored emergency and exit lighting will be provided in accordance with the AS2293 in all areas requiring emergency lighting such as stairs, internal passageways, and exit from the floor and building.

Internal lighting control will be provided in general areas to reduce the energy usage of unoccupied spaces by motion sensors, PE cells and time scheduling.

External Lighting will be in accordance with AS/NZS 1158 Lighting for roads and public spaces, AS 4485 Security for health care facilities and AS 4282 Control of the obtrusive

effects of outdoor lighting. The external lighting controls will be by PE cells, time-clocks and external motion sensors where required.

7.7 Telecommunications Services

The existing Garvan Institute lead-in telephone cabling and associated main distribution frame will be upgraded to allow the additional telephone lines required for the new Garvan St Vincent's Campus Cancer Centre provision.

A new tie-cable will be provided between the existing Garvan Institute main communications room to the new GSVCCC main communications room.

Additional lead-in cabling will be provided for retail/commercial areas from Victoria Street as required.

7.8 Incoming Communications Services

A new communications room will be established to securely house the equipment required to provide communication and computing services in the building. The room will be air conditioned. The room will be designed in accordance with the Australian Standards.

The incoming communications services will be part of the precinct network providing data and originate from the Garvan Institute main communications room and will provide both data and communications services.

7.9 Communications Distribution

There will be vertically aligned communications enclosures which will allow horizontal cabling to be reticulated from the floor below and the floor below. There will be access by the underfloor system or via the ceiling space to run cables to all rooms on each floor.

8 MECHANICAL SERVICES

8.1 Design Criteria

8.1.1 General & Energy

The building will be designed to meet the functional requirements of the spaces, including special laboratory requirements, whilst seeking to minimise energy use through the adoption of variable speed drives to fans and pumps where feasible and appropriate.

Central chillers will be selected to exceed the minimum energy performance requirement of the BCA Section J.

8.1.2 External Design Conditions

Summer: 32.5°C DB, 23°C WB.

Winter: 7°C DB

8.1.3 Internal Design Conditions

The following values are notional and subject to design development and detailed design.

Room	Occupancy (m^2 /Person)	Room Temp (°C)	Relative Humidity (%)*	Min. Outside Air (l/s/person)	Lighting Load (W/m^2)	Small Power (W/m^2)	Noise Level (NR)
Office / Consultation Rooms	10	22.5 ± 2.0	40 – 70	7.5	15	20	40
Meeting Rooms	1	22.5 ± 2.0	40 – 70	10	20	15	35
Toilets	N/A	NC	NC	N/A	N/A	N/A	45
Atrium	N/A	NC**	NC	N/A	N/A	N/A	40
Laboratories	12	22.5 ± 1.5	40-60	10	15	35***	40
Laboratory Support Rooms	5	22.5 ± 2.0	40-70	10	15	35***	40
Cool Room	Nil	4.0	N/A	N/A	N/A	N/A	N/A

NC = Not controlled

* No humidity control will be provided. The relative humidity range is generally achieved as a result of mechanical cooling.

** Not air-conditioned. Space will be tempered via return/spill air from adjacent conditioned spaces.

*** Values to be refined once equipment information is available. This is a general allowance however.

8.1.4 Exhaust rates:

Generally- In accordance with AS1668.2

Toilets - The greater of 10L/s/m^2 floor or 25L/s/fixture

Grease arrestor - 5 L/s/m^2 floor, 100 L/s min.

Cleaner cupboard - 5 L/s/m^2

Garbage room - 5 L/s/m^2, 100 L/s min.

Plantroom / storage room - 5 L/s/m^2 or sufficient to remove heat generated, 100 L/s min.

Laboratory (special) To meet special requirement

8.2 Proposed HVAC System

8.2.1 Proposed System

The air conditioning and ventilation system will consist of:

1. Air conditioning plant located on a dedicated upper floor and on the Garvan roof with plant areas within lower floors.
2. Chilled water air handling/ fan coil units located in plantrooms wherever possible;
3. Water cooled or air cooled chillers for central cooling and gas fired hot water heater for heating.
4. Mixed mode ventilation will be considered for write up areas and consultation suites.
5. Mechanical ventilation to toilet areas.

8.2.2 Free cooling and heat reclaim

Air side economy cycles will be provided for all systems, except where not appropriate for specific lab function.

Natural / mechanical night purge systems to purge heat from the building fabric overnight will be considered.

8.2.3 Special laboratory Systems

8.2.3.1 Fume exhaust

Fume cupboard exhaust systems will be provided. Extract fans will be located on the roof and discharges will comply with AS1668 for noxious discharge.

8.2.3.2 Supplementary Exhaust System

Specific local exhausts to dedicated equipment will be provided where necessary. These exhausts will discharge above roof level in accordance with AS1668.

8.2.3.3 Central Heating and Cooling Plant

Chilled water will be generated by water cooled or air cooled chillers selected for high efficiency. Chilled water storage vessels will be considered to minimise chiller run times at part loads. This will depend on the building use profile.

Chillers will run on refrigerant with zero ozone depletion potential with a minimum Coefficient of Performance (COP) to exceed the minimum requirements of the Building Code of Australia section J.

Duty and standby circulation pumps will be provided.

Gas fired modular boilers will be used to generate hot water for space heating.

Hot and chilled water will be reticulated to various parts of the building via variable flow circuits. Pumps will be fitted with variable speed drives (for variable flow systems only) and high or premium efficiency motors.

8.2.4 Air Filtration

High quality air filters in compliance with AS 1324 will be used in air handling units. The main and coarse filters will have minimum standards equivalent to type 2 class B with a performance rating of F4 and type 2, class B respectively. Filters will also be provided for outside air intakes into plantrooms and fume cupboard make up air intakes.

Consideration will be given to HEPA filters for some specific laboratories.

8.2.5 Mechanical Ventilation

All mechanically ventilated areas including toilets, tearooms, cleaner's rooms, garbage room, plantrooms, grease arrestor room and storerooms will be ventilated in accordance with the current AS 1668.2.

8.2.6 Carpark Ventilation

The car park will be mechanically ventilated.

8.2.7 Smoke Management

A fire engineered ventilation solution will be provided which comprises (subject to detailed design):

- A stair pressurisation system including all fire egress paths will be designed in accordance with AS1668.1;
- Lift shaft pressurisation systems will be provided in accordance with AS1668.1 and the fire engineering strategy;
- Possible Atrium smoke exhaust or natural relief;
- Shut down of laboratory air conditioning systems except fume cupboard fans.

Non laboratory air conditioning systems serving the fire affected floor that communicate directly with the atrium is to shut down. Those parts of the air handling system serving the non-fire affected floors that communicate with the atrium are to operate on 100% outside air. Return air is to shut down.

All systems to operate as per the fire engineered solution.

8.3 Building Controls

An electronic control system will control all HVAC equipment. The system will be based on a DDC system. Capability to integrate into the Garvan Institute's existing Building Management and Control System (BMCS) network will be considered. The BMCS will be able to automatically control, monitor and provide alarms for the nominated building services.

The system will allow time scheduling and facility for optimum start/ stop commands to minimise energy use for building warm up or cool down.

An operator interface panel will be provided within the plantroom MCC to allow monitoring, control and adjustment of the control system.

Laboratories will be provided with a control system, which may form part of the BMCS, which will maintain and control the various supply and exhaust systems to maintain a net inflow of air under all conditions.