HURSTVILLE PRIVATE HOSPITAL

Gloucester Road, Hurstville

BUILDING SERVICES SITE AUDIT AND RETURN BRIEF

DOCUMENT NUMBER: RB01

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REVIEW AND APPROVAL RECORD

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TABLE OF CONTENTS

1 Introduction

1.1 Services - General

Erbas & Associates have been engaged to provide Mechanical, Medical Gases, Hydraulic, Wet Fire, Vertical Transportation and Electrical Services for the proposed redevelopment and new works at Hurstville Private Hospital. The redevelopment comprises refurbishment of existing (approximately 2,600m2) and establishment of a new hospital wing (approximately 3200m2). The proposed redevelopment includes car parking, consulting suites, operating theatres, general wards, birthing suites and associated private rooms, maternity and associated private rooms and embellishment of existing areas to support the new facilities.
Site inspections were performed on 28th June and 2nd July 2012.
The areas inspected included rooms and layouts affected by the proposed refurbishment works as indicated on the DA Plans issued by HealtheCare on 27th June 2012 as well as the proposed new site of the new build. In addition, a general inspection of all the other areas was undertaken to establish their condition and note any necessary items that may need to be included in the Scope of Works.
The existing services were installed over a period of time commencing in about 1924. As surrounding buildings were purchased, each was refurbished to provide accommodation and facilities for the hospital. During the inspection it was found that some of the services dated back to the original installation with the remainder of the services added over time after that. In most instances, the majority of services were at or past their useful life and in need of replacement.
Observations and actions required that are over and above the typical design and documentation have been noted and are commented on.
Erbas is currently in the process of acquiring the current Annual Fire Safety Statement and any existing Fire Engineered Solution documentation. Pending this, the outcome could possibly impact on the design of the hospital essential services.
The fire services throughout the hospital seemed to be fit for purpose at the time that they were installed.
The scope of the essential service will require an NCC report to identify the code compliance to current or previous compliance.
It is believed that the proposed building will need to comply with the current fire hydrant and hose reel codes.

The mechanical services generally provided throughout the hospital were fit for purposes at the time they were provided. The majority of these services have passed their used by dates. Most of the air conditioning systems serving the renovated / redeveloped areas are located on the existing roof the Medical Centre which is in the way of the redevelopment. These mechanical services shall be relocated for temporary use during the construction period and shall be replaced with new systems when the new roof plant is ready.

The electrical services were fit for purpose at the time of installation and seemed to have been maintained well. However, some services are past their useful life or no longer comply with current standards and codes and will be upgraded or replaced during the works.

Hydraulic Services appear to have been fit for purpose at the various times that the buildings were constructed.

1.2 Existing Electrical Services

1.3 Power Supply

The hospital is served by an onsite outdoor chamber substation, located near the main entry on Gloucester Road. Further investigations are required to determine the capacity of the substation and the incoming supply as this was not apparent from any notices or labeling at the time of inspection. The transformer and ring main unit in the outdoor chamber is the old style oil filled type, no longer recommended for use throughout the Ausgrid network. The incoming consumers mains appears to have been upgraded in the past as an additional, relatively new main switchboard has been established in the existing main switchroom. Due to the increased maximum demand of the proposed works the substation may need to be upgraded to suit.
Gloucester Road is served by underground and overhead high voltage cables, which may assist in reducing the capital contribution costs when upgrading the substation and the supply for the new works.

Overhead cabling along Gloucester Road

1.4 Main Switchboards

The hospital was originally served by a single main switchboard. At some time the supply was upgraded, resulting in establishing a new main switchboard and back feeding the old main switchboard, which was then classed as a “sub – main switchboard”. Each main switchboard is divided into “Essential” and “Non-Essential” services. Neither main switchboard has been fitted with a Service Protection Device (SPD) and as such does not comply with the NSW Service and Installation Rules. The maximum demand for the hospital will increase and a new main switchboard will be required complete with an SPD. Existing consumers mains reticulate from the existing substation in underground conduits to a trench inside the main switchroom

1.5 Power Factor Correction

No power factor correction unit connected to either main switchboard was sighted at the time of inspection, however, will be required for the new works.

1.6 Distribution Boards

The MSB supplies a number of Distribution Boards and plant switchboards located in the plant rooms and throughout the floors of each existing building.
The existing distribution boards in the areas to be renovated are past their useful life, do not comply with current codes and will be replaced. Most existing distribution boards in the remaining areas are also past their useful life and most no longer comply with codes. Consideration should be given to their planned replacement in the near future.

Existing non-compliant distribution board (to be replaced)

1.7 Standby Generator

The existing facility has an emergency standby generator connected through an automatic transfer switch.
The generator and changeover switch are installed in the plant room behind the services area and provides back up power to the existing hospital critical care systems.
The generator is CUMMINS Gen Set 3 phase 190 kVA mains connected diesel powered unit with exhaust to the outside. The enclosure is fitted with louvres for intake ventilation of the generator. The generator log book was not sighted at the time of inspection.

Existing 190kVA diesel generator

The generator appears to be in reasonable condition. It is unlikely that the generator will support the existing critical essential load as well as the additional critical load associated with the upgrade of existing and the new works. Investigations during design development to determine whether a second generator can be installed and operated in parallel or a new larger generator will be required.

1.8 Lighting

The light fittings in the various areas are generally fit for purpose. The older areas of the hospital utilised old technology luminaires which will be replaced during the upgrade works. In any event the lighting systems in the hospital do not comply with the requirements of Section J of the NCC.

Most of the lights in the area's which are not due for refurbishment in general, patient care and operating theatres appear to be in reasonable to good condition and are in working order. It is unlikely that the luminaires will comply with Section J of the NCC and the hospital should consider their planned replacement in the medium term.

Exit and emergency lights are installed throughout the hospital back of house, office and patient care areas. The emergency lighting appears to provide adequate cover, but are of the older style. The lights appear to be in reasonable condition, although the battery packs will need to be tested to ensure reasonable service life can be assured. It is assumed the emergency lighting installation undergo regular essential services testing and maintenance to ensure proper operation. Most of the exit lights do not have the latest running man icon, these will be replaced with the new icon to maintain constancy throughout the hospital.

1.9 Communications

Major communications are located within the Comms Room and room behind the reception and include:

- Telephone Building Distributor with Krone frames.
- PABX
- Communications data cabinets and patch panels.
- TV and Music systems cabinet,

- Switcher, Sound mixer, PA power amplifier, Battery and charger.

A structured cabling system is then reticulated around the hospital. The systems and cabling appear to be in reasonable condition, however will not be suitable to be extended or amplified for the new works. A new structured cabling system (Cat 6 UTP or better) will be required for the new works

1.10 Code Compliance

The existing Hospital systems have been installed at various times and under different versions of standards and codes. Most of the existing systems no longer comply and consideration will be given to upgrading during the redevelopment and the new works.

1.11 Existing Mechanical Services

1.11.1 General

A general inspection was carried out to the existing Hospital areas for an overview of the mechanical services systems provided to the Hospital. No detail investigation was performed to most of the occupied areas. Detail investigations will be performed at the design stage.

Only very limited documentations were available to provide information about the existing mechanical services systems.

The majority of the existing mechanical services are over 20 years old. We understand that the policy was to replace broken down equipment only.

The design life of these types of equipment is 15 years life expectance and most of the existing mechanical service systems have exceeded its service life.

1.12 Air Conditioning System

The existing Hospital had been expanded at various stages and mechanical services were provided to suit the various extensions.

Operating Theatre 1 & 2 and the associated areas – These areas are served by two air-cooled chillers with associated roof mounted air handling units.

Operating Theatres 3 & 4 and the associated areas – These two areas are served by two built-up refrigeration plants composed of refrigerant compressors, air-cooled condensers and air handling plants.

Air conditioning to various other areas are provided via a number of independent air-cooled split type or air-cooled packaged type air conditioning units. Majority of the air-cooled condensers are located on the roof of the existing Medical Centre where additional levels will be added.

There is no central control panel provided to monitor the operation of these air conditioning systems.

1.13 Mechanical Ventilation

Mechanical ventilation systems are provided to various areas where mechanical ventilations are required mainly via roof mounted exhaust air fans.

Car park mechanical exhaust is provided as required and discharge at roof level.

Photos

			
1	Air-cooled chillers serving OT-1 & 2.	2	Associated chilled water inertia tanks
			
3	Roof mounted AHUs for OT-1 & 2	4	Refrigerant compressors for OT-3 & 4 AC systems.
			

5	Built-up air handling plants for OT-3 & 4.	6	Air-cooled refrigerant condensers for OT-3 & 4.
			
7	A/C air-cooled condensers serving areas below.	8	New A/C air-condensers located at the far end corner of the roof
			
9	Air conditioning and ventilation services on roof level	10	A/C air-cooled condensers located on roof level.

1.14 Code Compliance

No comment, as we did not go through the current installations in detail.

1.15 Existing Medical Gases Services

1.15.1 General

The plant spaces accommodating the existing medical gases plants are located on Basement level 2. These areas are in the way of the proposed development and need to be relocated to a new location. The exact location is to be allocated.

1.15.2 Oxygen

Cylinder supply system located in the Basement 2 level provides oxygen gas supply to various oxygen outlets in the hospital.

Each bank of the two banks consists of 12 cylinders in a rack and is located within a wire-fencing enclosure.

1.15.3 Nitrous Oxide

Cylinder supply system located in the Basement 2 level provides nitrous oxide gas supply to various nitrous oxide gas outlets in the hospital.

Each bank of the two banks consists of 2 chain-locked cylinders and is located within a wire-fencing enclosure.

1.15.4 Medical Air

The medical air plant is located in a wire-fenced enclosure in Basement 2.

Medical air is generated via two-off (2) “Atlas Copal” compressors, two-off (2) new “MTA” air driers and associated accessories.

Medical air system provides medical air to various medical air outlets in the hospital.

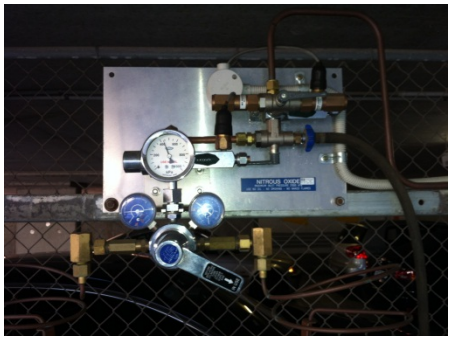
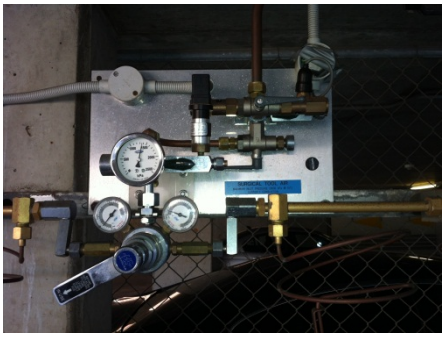
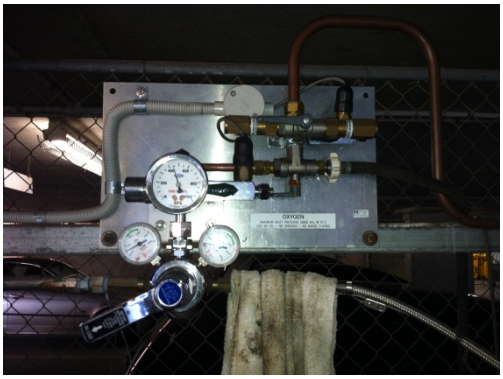
1.15.5 Medical Suction

The medical suction system is a compressed gas venturi ejector-operated suction system and is making use of the medical air supply as the compressed gas and provides suction services at the various suction outlets provided throughout the hospital.

1.15.6 Tool Gas

Cylinder supply system located in the Basement 2 level provides tool gas supply to various tool gas outlets in the hospital. Each bank of the two banks consists of 1 chain-locked cylinder and is located within a wire-fencing enclosure.

Photos

			
1.	Nitrous oxide cylinders setup	2.	Tool Gas cylinders setup
			
3.	Nitrous oxide gas manifold	4.	Tool gas manifold
			
5.	Oxygen gas cylinder setup	6.	Oxygen gas manifold

			
7.	Medical air compressors	8.	Medical air driers

1.16 Code Compliance

It is believed that the system was in compliance with the Codes requirement at the time it was built.

We have no further comment to the compliance issue as we did not go through the current installation

1.17 Existing Hydraulic Services

1.18 Generally

The pipework is generally concealed within the building and we have limited existing drawings to make comment on the material, condition and sizes of the systems.

1.19 Cold Water

The property has an existing incoming DN100 water supply to a utility meter & backflow device.
The supply to the building is boosted via a new triplex variable speed pumps and the pipework reticulates to all the sanitary fixtures and equipment to the property.
The pump set at the main entrance and supply pipe infrastructure will require upgrading for the rise in building height if possible but further evaluation of the pressures and flows are required.
Hospital staff has advised that the utility meter & backflow device fronting the Millett Street is redundant.
The existing reticulation to existing areas will be generally maintained and the new extension will be service via a new line to the building extensions.
We recommend the systems be surveyed via a pipe & cable locating contractor to report the location if the inground location of the service.

Incoming cold water supply and backflow prevention device

1.20 Hot Water

The property has two existing hot water circulation systems and water heater plant to each.
The Pearl Street plant looks to be adequate for the part of the building it services and the Rotex tanks should have 10 year serviceable life span.
The Gloucester Road plant looks to be adequate for the part of the building it services and the tanks should have 5 year serviceable life span.
Pipework insulation is inadequate and will be causing inefficiency's in the system.
The water temperature is regulated via Thermostatic Mixing Valves (TMV) and the existing TMVs in the building are of advanced years and will be considered for replacement.
The existing reticulation to existing areas will be generally maintain and the new extension will be service via a new hot water system and warm water plant for the new building extension.
Integration of the existing hot water system and new systems into one system could be considered if required.

Existing hot water plant

1.21 Natural Gas

The property has an existing incoming street 210kPa supply to the utility regulator/meter at the main entrance.
The supply to the building is a (2.75kpa) 100mm copper service and the pipework reticulates to all the appliances i.e. domestic hot water heaters and kitchen.
The existing reticulation will be generally maintained if found to be able to deliver the future demand.
The future demand will be affected, be the addition of new Mechanical plant and new domestic hot water demand from the extension or consolidation of plant.
We recommend the systems be surveyed via a pipe & cable locating contractor to report the location if the inground location of the service.

1.22 Sanitary Plumbing & Drainage

The sanitary drainage for the property has 3 systems and connection points to the Sydney Water sewer main.
Two systems drain to the Gloucester Road Sydney Water sewer, and one system drains to the Millet street Sydney Water sewer.
We recommend the systems be surveyed via a CCTV contractor to report the suitability of retaining the existing inground pipework and disruption to existing structural slab.

1.23 Fire Hose Reels

The existing hose reel system is installed to a previous code that is non-compliant to the current BCA requirements.
The water supply is believed to be from the cold water service and the existing hose reels will need to be upgraded to meet the current code to match the new areas.

1.24 Fire Hydrants

The property has an existing incoming DN100 water supply from Gloucester Road to a booster valve assembly without a containment backflow device.
The fire hydrants are boosted via an electric pump to Ord. 70 requirements.
We recommend the systems be surveyed via a pipe & cable locating contractor to report the location if the inground location of the service.

The current hydrant system will require upgrading to comply with the current National Construction Code.

1.25 Portable Fire Extinguishers

The existing building is service with extinguishers to meet the code and the new extension and refurbished areas will be added as need be.

1.26 Fire Detection

- Major detection including
- Smoke Detectors
- Thermal Detectors
- UESDA
- Gaseous Suppressor

1.27 Code Compliance

The new development will require a BCA consultant to advise the compliance of the essential service for the existing and proposed development.

The existing hydrant system is an Ord. 70 system that is non-compliant to the current BCA requirements.

The following is a list of the major issues:-

- The booster valve at the main entrance needs to be upgraded and relocated 10m from the building and sub-station.

- The hydrant pump needs to be replaced with a diesel pump and located 6m from the building.

- The existing and new hydrant valves need to be relocated into the fire stairs

- A pressure and flow test will be done on the existing pipework to confirm the existing pipework meets the current code requirements

2 EXECUTIVE SUMMARY – RETURN BRIEF

The subject works involve the design of new and redevelopment of the existing Hurstville Private Hospital in Gloucester Road Hurstville. The redevelopment comprises refurbishment of existing (approximately 2,600m2) and establishment of a new hospital wing (approximately 3200m2). The proposed redevelopment includes car parking, consulting suites, operating theatres, general wards, birthing suites and associated private rooms, maternity and associated private rooms and embellishment of existing areas to support the new facilities. Erbas Engineers have been engaged to undertake the design and documentation of mechanical air conditioning, electrical, security services, communications, medical gases, hydraulic, fire and lift services to accommodate the proposed works at the Hospital.

2.1 BCA Classification

In accordance the NCC National Construction Code NCC 2012, the building classification is;

Table A1.1:	Climate zone 5 (Sydney)
Part A3:	Class 9 a
Part C1:	Type A construction
Effective Height:	Greater than 15m, less than 25m

2.2 Mechanical Services

Air conditioning will be provided to the conditioned space via air cooled chillers, gas-fired heatpumps, air handling units and energy recovery systems to recover energy from exhaust air systems, variable speed pumps complete with associated ductwork and air distribution arrangement.

Air-cooled chillers and air handling units serving the top three levels shall be located on the roof.

Air handling units and variable air volume boxes will be providing air conditioning to the majority of the hospital complete with economy cycle.

Indoor fan coil units will generally be concealed ducted type located in ceiling space or bulkheads.

Wall mounted type indoor fan coil units will be provided to communications room etc.

Winter heating shall be provided via gas-fired heat pumps via the air handling or fan coil unit systems.

The system will be able to provide individual temperature control per zone. Each zone shall be designed to about 80 to 100 square meter.

Mechanical ventilation to amenities which includes the laundry room, dirty utilities, cleaners, toilets, electrical switch room and waste rooms etc. shall be provided as required in accordance with the National Construction Code (NCC), TS11 and Australian Standards AS/NZS1668.1 and AS1668.2.

2.3 Electrical Services

The existing substation at the front of the site in Gloucester Road will require upgrading to accommodate the additional load of the redevelopment and the new works. A new upgraded low voltage connection will be required for the proposed works from the new substation on the site. A main switchboard comprising non–essential, critical essential (generator) and essential will sub-distribute to distribution boards located within the redeveloped areas and to service each floor of the new areas. A percentage of planned spare capacity will be designed for the new infrastructure. An Ausgrid smart meter will be provided at the main switchboard location. Separate sub mains will be reticulated for Group A, Group B and Group C services.

It is unlikely that the existing generator will be sufficient for the new works. During design development an investigation will be conducted to establish whether the existing 190kVA generator can be retained and a similar sized generator utilised to run in parallel with the existing or whether it is cost efficient to install a new larger generator to serve the critical care areas.

A new communications fibre optic and voice lead-in cabling will be required for the proposed works. A new main communications room will connect the voice and data networks to the Hospital. Cabinets will be located to suit design requirements. Integrated Nurse Call/Security and Patient Entertainment Systems, Pocket Paging, BMS, Public Address and background music will also be provided.

Battery operated clocks will be provided.

Patient treatment areas where electro-medical equipment will be used for procedures will be classified as either body type or cardiac type will be designed in accordance with AS/NZS 3003.

Energy efficient lighting and control solutions will be provided based on ambient lighting conditions including perimeter dimming systems, motion sensors, time-clocks and addressable lighting, to reduce the lighting power density below NCC 2012 Section J requirements. Colour rendering of lamps in special areas will be provided in accordance with AS/NZS 1680.2.5.

Essential services, including emergency and exit lighting will be provided in accordance with the NCC 2012 and Australia Standards.

2.4 Hydraulic and Fire Services

The cold water supply to the hospital is boosted via triplex variable speed pumps that will need to be replaced with a new pump set to allow for the rise in height of the additional development. The incoming cold water supply to the site will require upgrading from the meter.

A new hot water and warm water plant will be provided to supply the re development. The existing hot water plant will be made redundant subsequently to commissioning the new hot water plant. The two existing hot water plants that currently supply the hospital will remain operational, until the new hot water plant has been installed and commissioned. A new warm water system will reticulate at 45°C to reduce the number of thermostatic mixing valves to the additional development.

A new gas line will be provided to supply the new hot water and mechanical plant. The existing reticulation will be generally maintained if found to be able to deliver the future demand.

The existing fire hose reel system is installed to a previous code that is now non-compliant to the current NCC and requires upgrading. Additional fire hose reels will also be required to service the new development and locations of fire hose reels shall be compliant with AS 2441-2005 Installation of Fire Hose Reels.

The current fire hydrant system will require upgrading to comply with the current NCC. The existing fire hydrant booster valve, located adjacent the main entrance to the hospital in Gloucester Road needs to be replaced and relocated 10 metres from the building, to comply with the current fire hydrant installation code - AS 2419.1-2005. The existing fire hydrant pump needs to be replaced with a diesel pump and located 6 metres from the building. The existing and new fire hydrant valves need to be relocated into the fire stairs.

The new roof area shall be eaves gutter type and designed to a one in twenty year event, for a six minute storm duration where a fail safe flood path exists. Where a fail safe flood path does not exist,once in 100 year storm of 6 minutes duration shall be used as a calculation basis as available from Bureau of Meteorology statistics.

2.5 ESD Principles

Environmentally sustainable design principles will be considered and incorporated during the design stage for all building services. Recommendations for consideration in the Architectural design have also been included.

The ESD initiatives will consider the following broad principles:

- Energy – reduction in energy consumption;
- Water – reduction in potable water usage;
- Materials – selection of environmentally friendly materials in construction and fitout;
- Indoor Environment Quality – improvement of the indoor environment and well-being of occupants

2.6 Vertical Transportation Services

2.6.1 Electric Traction Lifts

1.0 General

Two (2) emergency and disable capable machine room less electric traction lifts will be provided.

2.0 Requirements

2.1	DUTY:	1.0 m/s
2.2	PASSENGER:	25 passenger emergency and disable capable lift
2.3	FLOORS SERVED AND TRAVEL:	5 levels.
2.4	SHAFT SIZE:	Clear internal dimensions – 3,000 long x 2,800 wide.
2.5	STOPS AND OPENINGS:	Lift stops with openings both sides.
2.6	Lift Motor Room:	No Lift Motor Room.
2.7	POWER SYSTEM:	Electric Traction.
2.8	CONTROL:	The lift control shall be electronic solid state micro processor based. The controller shall incorporate self diagnosis faults with fault indication fitted.
2.9	INTERNAL CAR FINISHES:	Ceiling - Fire Rated Plastic Laminate Walls - Satin Stainless Steel Front Wall - Satin Stainless Steel Doors - Satin Stainless steel Floor - Tile. Lighting - Downlights. Ventilation - Ventilation Fan Rear Wall - Mirror & Satin Stainless Steel Handrail - 60 mm diameter stainless steel tube Skirting - Stainless Steel
2.10	TELEPHONE:	To be in included in lift car and wired to the telephone termination point. The communication telephone set is to be push button operation with auto dial operation. The auto dialler is to be provided as part of the contract. Auto dialler is to be set to ring lift company or 24 hour site manager. Nurse call point required.

2.11	CAR CONTROL PANEL:	Tactile and laminated micro touch buttons set into a panel. Installed to comply with AS 1735 part 12 for disabled operation. Buttons to be inscribed to international standards. All control panels shall be complete with Braille tactile indications.
2.12	CAR WIDTH AND DEPTH:	1,740 width, 2,300 depth
2.13	PIT AND HEADROOM:	1,600 pit, 4,350 headroom
2.14	CAR DOORS:	Fully automatic, power operated, central opening, horizontal sliding, with a clear opening of 1,300 mm wide and 2100 mm high.
2.15	LANDING DOOR AND FRAME FINISH:	Stainless steel
2.16	PASSENGER:	IDAS (Infrared Doorway Area Scanner)
2.17	LANDING BUTTONS:	Illuminating symbols located in a Brushed Stainless Steel faceplate positioned adjacent to the main landing entrance, landing panel to include dot matrix position with direction of travel arrows.
2.18	ACCESS TO PIT:	Steel ladder to pit by lift manufacturer.
2.19	LIGHTING:	Downlights with emergency battery inverter pack fitted to provide four (4) hours operation of one light upon mains failure. Provide fluorescent lighting in lift shaft. Provide general purpose outlets.
2.20	HAND RAIL:	Full length of side adjacent to the control panels and at a height of 900 AFFL. Timber finish.
2.21	LIFT WALL PROTECTION:	Provide one (1) set of removable protective lift wall covers, install fixings around the lift ceiling perimeter.
2.22	LIFT GUIDES:	The lift guides mechanism shall be of the roller type with fish plate guide rails.
2.23	CAR HEIGHT:	2,400 height (Finished false ceiling 2,280).

2.24	LIFT OPERATION IN FIRE CONDITION	Under Fire conditions the lift operation shall be in accordance with SAA lift code

3 MECHANICAL SERVICES

3.1.1 General

The majority of the existing mechanical services serving the new and redeveloped areas have exceeded or is approaching to the end of their designed service lives. The mechanical services serving the new work, redevelopment and existing areas where the air cooled condensers are located on the existing Medical Centre roof shall be demolished and new mechanical service systems be provided.

Due to the nature of the construction work staging to maintain the operation of the existing hospital, temporary plants will be required to keep the air conditioning systems working until the final plant spaces are ready.

3.1.2 Design Parameters

Design Conditions

Outdoor Design Conditions

Summer: 35.0oC Dry bulb temperature
20.0oC Wet bulb temperature

Winter: 5.0°C Dry bulb temperature

Indoor Design Conditions

Category 1 Areas (Fully Air Conditioned)

Temperature: 16oC to 24oC
Humidity: 30% to 60% RH

The Areas will be:

- The operating theatres
- Recovery
- Sterile supply stores
- LDR

Category 2 Areas (Fully Air Conditioned)

Temperature: 20oC to 25oC
Humidity: 50% RH (not specifically controlled)

The Category 2 areas are:

- Administration, Meeting Rooms and Offices
- Bedrooms
- Dining Areas
- Waiting and Entry
- Tea Room

Category 2 areas are proposed to be air-conditioned due to the high design outdoor conditions of 34.0°C.

Category 3 Area (Mechanical Ventilation)

Temperature:20°C to 27°C

The Category 3 areas are:

- Dirty Utility
- Toilets/ Bathrooms

Hours of Operation

- Patient areas: 24 hours
- Offices spaces: 12 hours

Noise Levels:

Noise levels generated by mechanical equipment in the occupied spaces will generally be in accordance with relevant Australian Standards. If strict noise criteria conditions are to be achieved, the mechanical design will require input from a professional acoustic consultant.

Number of Occupants:

The air conditioning and ventilation systems will be designed to accommodate the number of occupants based upon the seating provisions identified on the Designers documentation or as per recommendations in AS1668.2.

Outdoor Air:

Fresh air will be supplied to the areas at the rates as recommended in AS1668.2.

3.1.3 Design Compliance Standards

The complete installation will be installed strictly in accordance with the following rules and regulations based on editions current at the tender closing date.

- The current Building Code of Australia and amendments shall be applied to the mechanical services systems.

- Department of Health Engineering Services Guidelines Publication TS-11 Version 2.0 (December 2007).
- Australian Health Facility Guidelines.
- AS 1668 Parts 1 and 2, and
- All relevant Australian Standards

shall be the basis for all mechanical services policies and design guidelines for this building unless given a separate specification within this Return Design Brief.

3.1.4 Extent of Works

The extent of mechanical services works shall encompass:

Majority of the existing plants are air-cooled split type units with the air-cooled condensers located at the existing roof of the Medical Centre. For the air conditioning systems serving the existing areas which are required to operate during the construction period, the associated condensers shall be relocated to a temporary plant location to operate until the final plants are completed and ready to change over. We recommended that the air conditioning systems serving the “existing areas” in the existing Medical Centre to be replaced with chilled/heating water air conditioning systems after the completion of the new extension.

Decommission and demolish the existing mechanical services serving the new and redeveloped areas in stages to suit the construction staging. Provide temporary air conditioning plants to maintain air conditioning supply to areas where the existing plants are in the way of the construction.

Modification to existing mechanical service systems serving areas outside the new and redeveloped areas to clear the way for the new and redevelopment work. Temporary plants may be required to suit the construction staging.

New air conditioning systems to be provided to serve the new and redeveloped areas. The new air conditioning systems shall be feed by air-cooled chillers, gas fired heat pumps, associated pumps, air handling systems, air distribution systems, controls and electrical systems. Temporary plants will be required to suit the construction staging.

Mechanical ventilation systems to car park levels, laundries, amenities and any other areas where required.

Smoke management systems and stair pressurization systems as required and requirement to be confirmed by the BCA consultant.

3.1.5 Mechanical Services Systems

The following design principles for the mechanical services facilities will be utilised to serve the new and redeveloped areas.

Zoning and Locations Options

The following principles will be followed.

- The selection of the chillers shall allow for 50% redundancy so that essential areas shall have air conditioning supply when one chiller is down.
- Air conditioning systems shall have air filters to allow minimum fresh air quantities for people particularly in high population areas. Air filters will be made accessible for cleaning and filter status to be monitored by the BMCS to ensure adequate frequency of cleaning or renewal.
- UV air filtration system shall be provided to all air handling systems to improve the indoor quality by reducing bacteria, virus and mould, maintain the performance of the coils and eliminate odour.
- CO_2 sensors will be provided to monitor the outside air supply quantities.
- Air systems will be designed to be air tight in ducts and indoor air conditioning units and a review of the building fabric and ceiling details will be undertaken to ensure minimum leakage of air into or out of the building.
- Zoning of all air-conditioning systems shall acknowledge different dynamic loads and conditions likely to occur due to:
  - External glazing and wall materials
  - Roofs and suspended floors
  - Hours of operation
  - Clinical or process functions
  - Internal heat gain from people, lights, equipment.
- Good access for maintenance; Indoor air conditioning units are proposed to be located within the ceiling space out of the patient areas.
- For the mechanical services serving the Operating Theatres, a standby mode operation will be provided which allows minimum outside air for saving in system operating energy.
- Ultra clean air filter assemblies instead of HEPA filter assemblies are proposed to the Operating Theatres for special procedures such as orthopaedic surgery, organ transplant or total joint replacement.

3.1.6 Energy Conservation and ESD Considerations

The following outlines a number of ESD principles which may be considered / incorporated as part of the proposed mechanical service work:

- Avoid any direct electric space heating. Gas-fired heat pump is proposed for the heating source. Gas-fired heat pump is approximately 165% more efficient than a gas boiler.
- Day only office areas and 24 hour occupied patient areas to have separate systems.
- Localised air conditioning systems to serve intermittent use areas such as Meeting, Activity and Dining Rooms etc.
- Indoor air quality: Designed locations of outdoor air intakes will exceed the minimum regulations to minimize the outdoor pollution.
- UV air filtration will be provided to improve the indoor air quality, air disinfection, minimize the airborne nosocomial infections, mould & fungus control and improvement to the coil performance.
- CO_2 sensors to be provided to monitor the outside air supply quantities to air handling units.
- Energy efficient fans will be selected as part of the work.
- High performance motors will be specified as part of the work.
- Provision of a Building Management Control System (BMCS). The system should be an open protocol with BACnet standards.

3.2 Building Management Control System (BMCS)

3.2.1 General

The existing Hospital does not have a BMCS. A BMCS shall be provided for control/monitoring of building functions with the ability to interface with the existing Hospital BMCS points if available in the future. All plant will have DDC control. The system will have a central BMCS control with intelligent outstations. Each outstation will have 20% spare capacity for future tenant use.

The building automation system will consist of standalone microprocessor based controllers, located throughout the new and redevelop areas and connected via a network to allow data to be transferred around the system. Current generation personal computers will be utilised to provide the operator interface and user friendly software provided to facilitate operation and monitoring of the building.

The system will incorporate functions to enable data to be collected and displayed in a number of formats to facilitate system troubleshooting and fault diagnosis. Operation of the system will be performed primarily by a graphical user interface and interactive graphic screens.

High level interfaces (via BacNet) shall be provided with the following systems:

- Future lift system
- Lighting control system
- Emergency generators
- Various meters

The system shall incorporate the following principal features:

- Open protocol system with interface to both BacNet and Lonworks.
- Entire system supported off essential (generator/UPS) power.

The system shall incorporate one head-end workstation equipped as follows:

- Current generation PCs
- 26 inches LCD monitors
- Colour printer (1 off)
- Alarm printers (2 off)
- Windows XP Professional or Windows 7 software
- BAS software (latest revision at time of practical completion)
- MS office
- Modem for remote dial in
- Modem for auto dial to pager
- Provide software for remote terminal

3.2.2 Detailed Extent of Work

The system will be installed to control and monitor the following:

All Mechanical Services including:

- All air handling units and fan coil unit and extract/return air fan systems including supply and return air temperatures, chilled water valves, filter status, variable speed drives, dampers, etc.
- Fan static pressures to enable fan status/failures to be determined and alarms raised.
- High efficiency filter alarms.
- All space temperatures, variable volume boxes.
- Space relative humidity and outside air temperatures in a sample of areas.
- Air quality/CO2 levels in major air handling systems.
- Entering / leaving chilled water temperatures on the “District” cooling connections.
- Entering / leaving heating water temperatures on the “District” heating connections.
- Car park mechanical ventilation systems control, status and alarm.
- Smoke management systems and stair pressurization systems status and alarm.
- Medical gases, medical air, vacuum and anaesthetic gas scavenging status and alarm.
- Various ventilation systems operation status alarm.
- Main LV switchboard room over-temperature alarm.

Various Electrical Services:

- Customer metering equipment within the main switchboard to monitor various electrical operating parameters, this equipment shall be connected to the: -

1. Incoming consumers mains.
2. Individual floor distribution feeds.
3. Lighting controls
4. Major plant items.
5. Emergency generator (if applicable)

Various Hydraulic Services including:

- Appropriate hydraulic alarms inputs including high/low level tank alarms, pump, run/fail status.
- Gas and water meters

Various Medical Gases Services

- Repeat of the MGS alarm panels status.

Miscellaneous Services including:

- Miscellaneous other items considered appropriate during the design development.
- Alarm monitoring from lift and fire systems.
- Over temperature alarm in comms rooms.
- Interface with fire alarm and security system.

4 MEDICAL GAS SERVICES

4.1 General

The existing medical gases storage and plant spaces are located on the Basement 2 areas and are in the way of the new and redevelopment areas. A new location is to be allocated in the new development to accommodate the relocated & "expanded" medical gas services plant to suit the new and redeveloped areas.

Due to the nature of the construction staging required to maintain the operation of the existing hospital, temporary medical gases plants will be required to suit the staging of the construction work.

4.2 Medical Gas Services

The medical gas systems to be provided to the new and developed areas will be designed in accordance with Current Australian Standards. The MGS will be designed to provide a safe and effective method of delivering the required medical gases form the source of supply through a piped system to the patient/medical equipment, via a terminal unit (TU).

The MGS to be provided shall be in accordance to the relevant room data sheet to be provided.

We were informed that the oxygen consumption in the hospital is big and an oxygen vessel is proposed. Finalized vessel location is pending.

Medical gas systems will be connected from the relocated and expanded plants and reticulated throughout the new and redeveloped areas to where medical gas terminal units are required.

The medical gas systems will also be reconnected to the existing medical gas systems serving the other areas not covered in the redeveloped areas. The process of the medical gas services plant relocation shall be performed in a way to minimize the disturbance to the hospital's normal operation.

During the construction period, the existing medical gases plants may need to be relocated to a temporary location to suit the construction.

The existing suction system in the hospital is a compressed gas venturi ejector-operated suction system. NSW Health is the only States Health Organization still using this suction system and have started to phase out this system and replace with vacuum suction system. We proposed to provide a new vacuum suction system for the new and renovated areas and leave the other existing areas to use the existing compressed gas venturi ejector-operated suction system.

The proposed new vacuum plant shall be located on top roof level.

As the existing medical gases plants are located on the lower basement level and may be in the way of the new construction work. Temporary plants may be required during construction period. This matter is to be sorted out when a construction staging plan is available.

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5 ELECTRICAL SERVICES

5.1 Scope of Works

The services included in our scope of works include:

- Upgrade of existing substation
- New incoming low voltage supplies
- New Main switchboard
- New sub mains (Emergency Services Essential , Critical Care Services Essential and General Services Non-Essential)
- Energy metering & sub monitoring metering system
- New generator and associated equipment
- Uninterruptable Power Supplies
- Distribution boards
- Earthing
- Surge Protection
- Body and Cardiac Protection
- Medical Panels
- Internal, special and external lighting, including controls
- Emergency and Exit Lighting
- Socket outlets
- Structured Cabling System
- Wireless Network
- Paging System
- Integrated Nurse Call/Security and Patient Entertainment Systems
- Emergency and exit lighting system
- Lightning Protection and Earthing

5.2 Compliance

The Electrical Services design shall be fully compliant with the following design guidelines, codes and standards under deemed to satisfy provisions, unless otherwise over-ruled by engineered solutions:-

- AS/NZS 1158 Lighting for roads and public spaces
- AS/NZS 1668 Automatic shutdown of air handling systems
- AS/NZS 1680 Interior Lighting general principles and specific sections.
- AS/NZS 2293 Emergency and EXIT lighting
- AS/NZS 3009 Electrical Installations emergency power supplies in hospitals

- AS/NZS 3811 Hard wired patient alarm systems
- AS/NZS 3003 Electrical Installations-patient treatment areas of hospitals, dental practices and dialyzing locations.
- AS/NZS 2500 Safe use of electricity in patient care areas
- AS/NZS 2293 Emergency escape lighting and exit signs for buildings
- AS/NZ 3000 SAA Wiring Rules
- AS/NZS 3008 Electrical Installation, Selection of Cables
- AS/NZS 3439 Switchgear and control gear assemblies
- AS/NZS 4282 Control of the Obtrusive Effects of Outdoor Lighting
- AS/NZS 1768 Lightning Protection and Earthing
- AS3080 Telecommunication Installations- Generic cabling for commercial premises
- AS/NZS 3087 Telecommunications installations – Generic cabling systems – Specification for the testing of balanced communication cabling in accordance with values set out in AS/NZS 3080:2000
- AS/ACIF S008 Requirements for authorized cabling products
- AS/ACIF S009 Installation requirements for customer cabling
- IEEE 802 series. LAN/MAN Standards
- IEEE 802.11. Wireless Standards
- AS 2201.1 to AS 2201.5 Intruder alarm systems
- National Construction Code (NCC2012)
- Local Electricity Supply Authority
- Local Municipal Council
- Local Fire Brigade
- Telstra Australia
- Green star requirements
- Workcover Authority of NSW

5.3 Authorities

A letter has been submitted to Ausgrid outlining the proposed works and the estimated maximum demand. Ausgrid has carried out an assessment of this demand and the capacity of the existing substation to support it. It has been established that the existing substation will not be able to support the load without amplification. A new substation will be required for the development and a cutover strategy will need to be investigated during design development and implemented to ensure that the hospital is not without power at any time.

5.4 Incoming Low Voltage Consumers Mains

The new incoming underground consumers mains will be sized in accordance with the estimated maximum demand for the proposed works including future contingencies. It is not known if the existing conduits from

the substation to the main switch room under the driveway is of sufficient size to take the new consumers mains.

5.5 Main Switchboard

A new main switchboard will be provided in accordance with AS 3439.1 and will be located within the dedicated 2 hour fire rated switch room adjacent to the ground floor reception. The switchboard will accommodate supply authority C/T metering plus a service protection device in accordance with the NSW Service and Installation Rules. The switch board will be separated into Emergency-Essential, Critical Care Essential and Non-Essential with provision for automatic changeover from mains supply to generator supply. The switchboard shall also incorporate a 'point of entry' surge protection device associated the building voice /data network installation. The doors to the switch room shall be full height outward swinging type and lockable.

A power factor correction unit will be provided to maintain the power factor above 0.95.

5.6 Metering

Tariff metering provisions will be provided as part of the new main switchboard. The Ausgrid smart meter will be mounted on a standard meter panel wall mounted within the main switch room.

5.7 Energy Monitoring

Energy monitoring will be provided in accordance with Clause J8.3 of the NCC:

- Air Conditioning Plant
- Artificial Lighting
- Appliance Power
- Central Hot Water Supply
- Lifts
- Other ancillary plant

The energy monitoring C/T's and meters will be capable of being connected to and interfaced with the BMS system, which will record the consumption of gas and electricity.

5.8 Generator

The hospital has an existing Cummins 190kVA generator on site which is at capacity. During design development a feasibility study will be undertaken on whether the existing generator be retained and a new generator be purchased of a similar size to operate in parallel with the existing generator, or a new larger capacity generator be purchased to take the expected maximum demand.

The generator (s) will supply the following services:

- Emergency evacuation lighting systems
- Fire alarm systems
- Emergency Warning and Intercom
- Emergency lifts
- Critical Care Areas
- Surgical

- Equipment required to continue (battery operated or gas operated) critical care procedures or resuscitate a patient
- Other areas deemed by the Users

5.9 Uninterruptable Power Supplies

Uninterruptable power supplies will be provided for Operating Theatre Lighting, IT/Communications main campus hub racks and other areas as identified during the user group process.

5.10 Low Voltage Electrical Distribution

From the main switchboard, low voltage sub mains will distribute to various distribution boards that will service the building. The sub-mains will be sized to meet the demand requirements for each portion of the installation and the building, as well as future contingencies.

In the new works vertically aligned electrical services penetrations will distribute services to the distribution boards on each floor. The sub-mains will reticulate on cable tray. Separate sub mains will be required for Emergency Essential, Critical Essential and Non-Essential systems.

Each riser will require a minimum 2 hour fire rating, including services cupboards.

5.11 Distribution Boards and Power

New distribution boards will be provided to serve the general lighting and power requirements of the areas to be redeveloped as well as for the new works. All distribution boards will be provided with RCD protection in accordance with AS/NZS 3000 for lighting and power circuits.

Power will be provided as required to suit functionality and equipment requirements. Circuits will be established from distribution boards located on each floor or area, and reticulate concealed and surface to outlets, equipment and other trade items.

Separate distribution boards will be required for Emergency Essential, Critical Essential and Non-Essential systems.

5.12 Body and Cardiac Protection

Patient treatment areas where electro-medical equipment will be used for procedures classified as either body type or cardiac type as defined by AS/NZS 3003 will have electrical installations installed to comply with AS/NZS 3003 and AS/NZS 2500. All patient areas will be provided with a minimum Body Protected wiring system. The patient areas are defined as areas where patients will be located for treatment, diagnosis or accommodation including patient suites, bathrooms and holding areas.

Cardiac Type Procedures:

- Emergency resuscitation bays and critical care areas
- Imaging
- Operating Suites

5.12.1 Medical Panels

Integrated medical panels will be provided at bedheads and other clinical areas. Outlets will be provided to operating theatre pendants complete with RCD's. Systems will be selected during design development.

5.12.2 Protective Devices

Wiring to power outlets and electrical equipment within the cardiac or body protected areas will be protected by either:

- Residual Current Devices (RCD's)
- Isolation transformer or Line Isolation Monitors

All final sub-circuits in the hospital wards will be wired to body protected wiring standards in accordance with AS/NZS3003 which requires 30mA RCD's to be installed.

Areas that are cardiac protected require 10mA RCD's to protect socket outlets.

5.13 Lighting

5.13.1 External Public Areas

Lighting throughout external public areas shall be designed to comply with AS 1158.3.1: Pedestrian area (Category P3) Lighting. The position and type of luminaires shall be selected to comply with the requirements of AS 4282 (Obtrusive Lighting Code)

5.13.2 Internal Areas

Internal lighting will be provided based upon compliance, performance, energy efficiency, reduced glare, ease of maintenance, aesthetic look and budget. The lighting, as a minimum, will be designed to comply with the energy efficiency requirements of Section J of the NCC2012 and AS1680 and the various applicable parts.

Switching to all public area lights shall be located in lockable electrical riser cupboards, plant or store rooms to prevent public access. Lights to external areas shall be controlled by photoelectric cell and multi-channel timers.

Lighting in areas such as administrative and patient areas will be DALI dimmable and will reflect the ambient lighting conditions for different times of the day by integrating with natural light.

Lighting will be provided in accordance with AS1680 for maintained lighting levels including consideration of the range of tasks within a hospital building.

Lighting will generally be low energy linear T5 fittings for fluorescent lighting, LED or compact fluorescent lighting where down lights are to be used. Generally warm white lamps (3500 deg K) are recommended for patient suites and common access areas. White lamps (4000 deg K) are recommended for all staff BOH areas including kitchen, office, stores, corridor and communications room.

Special colour rendering lamps will be installed in luminaires in the following areas:

- Observation Units
- Anaesthetic Rooms
- Recovery Units
- Birthing and Obstetric Rooms
- General Inpatient Units
- Corridors and lifts used for the transfer of patients between operating rooms and inpatient units.

Areas requiring usual identification of medical conditions will have lamps with a minimum colour rendering index of Ra=85 in order to detect cyanosis. Only lamps meeting this criteria will be used in araes nominated by medical users.

The following types of light fittings are proposed for the project:

- External entry areas: Recessed weatherproof downlights and floodlights using either metal halide or LED lamps, and wall lights.
- Carpark: Weatherproof floodlights, metal halide, high quality tightly controlled beam spread to reduce unwanted glare.
- Entrance Lobby, Lift Lobby and Floor Lobbies: Compact fluorescent and LED fittings with dimmable LED to highlight architectural features and artwork.

- Administration: Recessed / suspended linear T5 fluorescent fittings with low brightness diffusers & compact fluorescent / LED downlights.
- BOH kitchen: Recessed IP65 rated T5 fluorescent fitting with gasket sealed acrylic diffuser
- Cool room: Surface IP65 rated T5 fluorescent fitting with gasket sealed polycarbonate diffuser
- Dry store: Surface T5 fluorescent batten with acrylic diffuser.
- Office, stores, toilets, staff change: Recessed/surface mounted T5 fluorescent fittings & compact fluorescent / LED downlights.
- Toilets: Recessed compact fluorescent / LED downlights.
- Corridor/Circulation: Recessed compact fluorescent / LED downlights or surface mounted oyster lights.
- Communications Room: Surface mounted T5 fluorescent batten with acrylic diffuser.
- Main switch room and Communications Room: Surface mounted T5 fluorescent batten fittings.
- Patient Suites: Recessed lighting to entry/hall comprising compact fluorescent downlights. Surface mounted or recessed compact fluorescent or LED oyster type luminaires to all interior areas. Patient dual purpose reading lights/observation lights will be mounted at each bed head.
- Patient bathrooms: Surface mounted fluorescent oyster or LED downlights. Concealed T5 fluorescent or LED vanity area illumination
- Patient care areas and corridors: LED or compact fluorescent night lights will be mounted at low level and will be low intensity and diffused.
- Clinical Areas: Clinical observation lights will be provided.
- Operating Theatres: LED operating theatre overhead lights will be provided as well as general purpose special colour rendering downlights and general lighting.
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Emergency and Exit Lighting

An emergency and exit lighting system is required to all internal areas including corridors, stairs, circulation spaces and egress paths in accordance with the NCC and AS/NZS 2293 to enable evacuation in the event of an emergency. Generally the emergency lighting installed will be the recessed spit-fire type complete with dome cover or an integral battery inverter pack in linear fluorescent luminaires. All EXIT signs in public spaces will be LED edge lit type. The emergency and EXIT lighting system will be monitored type.

5.14 Lightning Protection and Earthing

A lightning protection and earthing system in accordance with AS/NZS 1768 will be provided.

5.15 Communications

The hospital will be provided with a structured cabling communication voice and data network. The telecommunications system will be installed in accordance with the Australian Communications and Media Authority (AMCA) requirements. Provision for voice over IP (VoIP) will be allowed within the design. WIFI

access will be made available in all public areas including patient suites. An integrated nurse call/access control, CCTV, duress, intercom, MATV, patient entertainment, public address system similar to Questek will be provided.

Interconnections for security, lifts and fire panels will be co-ordinated with the appropriate services and connected to the public networks.

Fibre Services

A lead-in fibre optic cable connection will be required for the proposed works. New fibre optic cabling will be provided from an existing comms cable pit adjacent to the development to the lead-in communications room on the ground floor, terminated at a wall mounted fibre termination cabinet in the new communications room.

Voice Services

A lead-in voice grade copper cable connection will be required for the proposed works. New Cat 3 voice grade cabling shall be provided from an existing comms cable pit adjacent to the development to the new lead-in communications room on the ground floor, terminated at a wall mounted Krone type MDF.

Communications Room

The building will have a main communications room located on the ground floor. This room will be the main hub and termination point for the voice and fibre services for the hospital. The Communications Room will house the following services:

- PABX or VoiP rack complete with a 2 hour UPS.
- PMS and interface POS, call accounting, VOD TV and data billing
- Administration server rack
- Integrated nurse call, security, public address, paging, MATV, PAY TV and patient entertainment systems headend
- A rack of patch panels and fibre management trays in which to terminate to the telecommunications outlets on the ground floor and floor distributors to each floor.
- MDF/IDF for incoming PSTN lines (wall mounted)

In each rack location, at least 600mm clear space is required around each rack for access. The comms room door shall be outward swinging and is required to be lockable. The comms room will be air conditioned.

The communications equipment racks will be floor mounted and minimum 45RU. The racks will be complete with power channel, shelves, rack ventilation, door, horizontal and vertical cable management, rack mounted uninterruptible power supply, patch panel, fibre termination panel and spare space for 2 off rack mounted DVR's as provision for the integrated nurse call /security/CCTV system equipment.

Vertical Distribution

Vertical telecommunications fibre and copper cable distribution shall be provided by riser cabling from the ground floor Communications Room Campus Distributor to the voice/data riser cupboards and Floor Telecommunications Closets for telephony and high speed internet services.

The hospital will have one (1) vertical riser from the ground floor up the building within the new works. Cable basket/s of sufficient size (including space for future cabling installations) is to be fitted within each riser.

The fibre backbone will comprise 12c SMOF cabling and the copper backbone will comprise Cat 3, 100 ohm multi pair copper cabling. The number of pairs of backbone cabling will be determined by the telecommunications outlet quantity with an allowance for 30% spare for future requirements. Additional cores and cables will be subject to a bandwidth analysis of the system. All backbone cabling will reticulate to Communications Closets on each floor via a dedicated fire rated vertically aligned riser.

Service providers will be approached to ensure copper lead-in or fibre optic lead in cables are of sufficient capacity.

Horizontal Distribution

The horizontal cabling shall be star wired horizontal UTP cabling with RJ45 outlets to carry Category 6e applications. All UTP cable, patch panels and jacks and other materials shall be in accordance with the recommendations of AS/NZS 3080.

RJ45 outlets will be installed as provision for WIFI modems in patient suites, administration and common areas as required. Whereas standard flush mounted dual RJ45 outlets will be provided within the back of house administration office and associated staff areas as required. Cabling will reticulate back to the ground floor voice/data distributor and voice/data equipment rack within the ground floor communications room. It is expected that cable basket will be installed in corridor routes and cables will reticulate via the cable basket to the location closest to the final outlet or riser location. As it is necessary for cabling to leave the basket, catenaries or J hooks shall be used to support the cable to the final drop point. All cabling will be wrapped with velco straps. All outlets will be flush mounted on walls or within joinery.

Telephone Connections

The lifts shall be provided with the mandatory telephone service for use during lift malfunction. The VoIP/PABX system shall interface with the Building Management System.

5.16 Integrated Nurse Call / Security and Access Control System (s)

5.16.1 Nurse Call

An integrated system will be designed on a common platform to accommodate a range of services in a common head end. The nurse call component will be hard wired and installed in accordance with AS 3811 – Hard wired patient alarm systems. Nurse activated emergency call buttons will be separate from the patient call button. The system will comprise the following:

- Patient Care System GUI

- LCD Annunciators
- Staff Assist
- Multi-Function Handsets
- Nurse Call Push Button Stations
- Infection Control Handsets

5.16.2 Security

A security / intercom / access control / infant medical alert and protection system integrated into the nurse call system will be considered during design development and will incorporate alarm monitoring and electronic controlled access to the main building entries. Building perimeter security detection (reed switches) and electronic door control will be provided to allow staff to control entry into the hospital.

The access control system control panel shall be located in the Administration Office on the ground level. Access control using key card / proximity readers for the wireless electronic locks shall be provided to gain access into the hospital. Reed switches shall provide intruder detection for all external doors including fire stairs. Door alarm monitoring of all external ground floor doors shall be connected to an alarm buzzer in Reception. Each door shall have separate isolation switch and mute facility.

Duress alarm points will be installed to the following locations:

- Front Entrance
- Reception
- Staff and Nurse Stations
- Pharmacy
- Cashier Areas
- Any area where staff are regularly alone with patients

Personnel duress alarms will be considered for staff at risk in the performance of their duties.

Security lighting will be designed to take into account the requirements of the security system.

5.16.3 Paging System

A paging system will be provided to augment the hospital telephone system. This facility will be used for arrangements for assistance call and other emergency signals.

5.16.4 CCTV System

A new closed circuit television system with intercom will be provided. CCTV cameras shall be provided to the following areas, with split screen monitors and time lapse DVD recording facility:

- Car park entrance outside roller shutter
- Car park entrance inside roller shutter
- Main entry (external)
- Reception desk
- All external ground level doors or elevations to allow staff to control entry into the hospital

Digital video recorders (DVRs) will be provided to record footage for a minimum of one (1) week. The DVR's and multiplexer will be installed in a ventilated lockable cupboard and a flat screen colour monitor will be provided in a location to be determine during design development.

Video intercom shall be provided to the following locations:

- Within car park
- Outside main entry
- Any other external doors or gates normally accessible to the public

The intercom system shall be integrated into the telephone system.

5.16.5 Infant Medical Alert Protection and Communications System

Consideration will be given during detail design for the implementation of an infant medical alert protection and communications system. The system will comprise the following:

- Mother infant matching linked tags, via integrated wireless devices and visual monitors to track movement.
- Any attempt to remove a tag or take the infant through a monitored exit immediately raises an alarm

5.16.6 PACS (Patient Archiving and Communication System)

Consideration will be given during design development to the design of a PACS or similar system in order to bring IT technology to the bedside from a central server. The system will simplify and refine medical records and archiving towards a "paperless" hospital.

5.16.7 MATV (Patient Entertainment) System

A Patient Entertainment System will be provided in the form of a receiving antenna, amplifiers, splitters and coaxial backbone cabling. The design of the cabling network shall be suitable for Digital Free-to-Air signal reception and shall comply with AS 1376, plus the technical and space requirements of the current Pay TV (Foxtel) providers for transmission of PayTV signals to access movies, TV, video games internet and email to each RJ45 outlet. All headend equipment and peripheral devices will be located in the main communications room.

Background music systems will be provided for the following:

- Lobbies, Reception, Public Toilets and other public spaces
- Conference Room

These shall be provided with quality amplifiers, a CD player and ceiling mounted speakers. Each area will be isolated

Two microphone outlets shall be provided in each meeting (conference) room, connected to the meeting room amplifier. Link switches shall be provided to enable each microphone or CD player to be connected to speakers in connected rooms.

The CD player and amplifier for the lobbies, public spaces and reception areas will be located in the 19" server rack cabinet located in the main communications room.

The CD player and amplifier for the conference room will be located in the conference area store.

5.16.8 Conference Room Audio Visual

The extent of Audio Visual systems is as follows:

- Integrated touchpanel for control of lighting, sound system and air conditioning
- Projector
- Motorised screen
- Laptop inputs
- Floor box and compatable table box
- Lectern

Roof Equipment

Space shall be provided at roof level for satellite and microwave transmission plant and dishes that may be required by the PayTV provider subject to Authority approvals and weight limitations.

5.17 Automatic Fire Detection & EWIS/PA System

A complete analogue addressable smoke detection and emergency warning interface system shall be provided in accordance with AS/NZS 1670. The main fire indicator panel will be located in the hospital main foyer on ground floor. The associated BOWS/PA control panel shall be located adjacent to the new fire indicator panel.

From the main fire indicator panel, smoke / thermal detectors as well as BOWS/PA speakers will be provided to protect the complete hotel complex.

Connections will be provided to mechanical and hydraulic fire services equipment to trip air conditioning systems in the event of a fire in accordance with AS/NZS 1668.

The BOWS/PA system shall comprise recessed and surface mounted loudspeakers throughout the common and patient suite areas of the building. The loudspeaker system may be utilized as a public address system for staff announcements during normal periods, with however an automatic over-ride function in the event of a fire condition to meet AS/NZS 1670.4 requirements. The automatic fire detection and alarm system shall also be integrated with the hotel Building Management System (BMS

6 HYDRAULIC SERVICES

6.1 Scope of Works

The services included in our scope of works include:

- Sanitary Drainage
- Sanitary Plumbing
- Trade Waste plumbing and drainage
- Rising mains and pumps
- Fixtures and fittings
- Water services (hot and cold and warm water systems)
- Gas services (natural gas)
- Fire Hydrant systems and fire hose reel system
- Roof gutters and downpipes
- Portable Fire Extinguishers

6.2 Compliance

The Hydraulic Services design shall be fully compliant with the following design guidelines, codes and standards under deemed to satisfy provisions, unless otherwise over-ruled by engineered solutions:-

- AS/NZS 3500.1:2003 Water Services
- AS/NZS 3500.2:2003 Sanitary plumbing and drainage
- AS/NZS 3500.3:2003 Stormwater drainage
- AS/NZS 3500.4:2003 Heated water services
- AS 2419.1-2005 Fire Hydrant Installations
- AS 2441-2005 Installation of fire hose reels
- AS 5601-2010 Gas Installations
- WorkCover Authority of NSW Safety Guide No.4517 in regard to Thermostatic Mixing Valves installed in Healthcare and Accommodation Industries

- NSW Health Department Circulars outlining requirements for the provision of cold and heated water
- AS 4032 series - Water supply – valves for the control of hot water supply temperatures
- Requirements of the Building Code of Australia
- Manufacturers requirements and recommendations
- Occupational health and safety requirements
- The requirements of all water and statutory Authorities
- The requirements of local councils

6.3 Design Parameters

Service	System	Criteria
Water Services	Domestic Cold Water	Maximum pipework distribution Velocity: 1.8m/s
	Domestic Hot Water	Storage temp: 65°C where heat is used as a sterilization medium. Delivery temp: 43.5°C at each sanitary fixture used for personal hygiene purposes. Kitchenettes and janitors cupboards to be provided with water at 65°C. Maximum pipework distribution velocity: 1.0m/s
Sanitary drainage	Loading units	As per AS 3500
Drainage and sanitation systems	Discharge units	As per AS 3500

6.3.1 Site Water Supply

The property has an incoming 100mm water supply pipe connected to a 150mm water main located in Gloucester road. The Utility water meter and backflow device is located adjacent to the hospital's main entrance in Gloucester road. The existing cold water pump set located adjacent to the main entrance, will require upgrading, as the pressure in the water main and duty of the existing pump set is not suffice to

supply the building extension. The new cold water pump set will be housed in a new cold water and fire hydrant pump room enclosure near the main entrance and will be a minimum of 6m away from the building. The redevelopment will utilise the existing cold water supply to the site, as there is sufficient capacity.

6.3.2 Backflow Prevention and Filters

Backflow prevention devices will be provided in accordance with AS/NZS 3500 requirements and those of the local authority. The existing RPZD located at the water meter is to be serviced to ensure it is in good working order. Additional backflow prevention is also required at sources that require zone and individual protection i.e; dirty utility room.

Water filters should be installed on the potable water supply to protect thermostatic mixing valves and sensor-operated tapware.

6.3.3 Domestic Hot and Warm Water Systems

A new hot and warm water plant will be provided to serve the hospital's existing and additional hot water requirements. The existing hot water plant will remain operational and service the hospital's hot water demand. The existing hot water plants will then be made redundant, after the new hot water plant is commissioned.

Thermostatic Mixing Valves (TMV) currently regulates the water temperature and these TMV's are at the end of their service life, and should be considered for replacement. The existing hot water reticulation will generally be maintained and the new extension will be serviced via the new hot water plant. A warm water system will be provided to the ablution and sensitive areas at 43.5°C via a centralized circulating system to reduce maintenance of additional TMV's.

6.3.4 Natural Gas

The existing gas meter shall be upgraded to meet the increased demand for the redevelopment. Gas supply to the existing hot water plant will remain active during the redevelopment the new hot water plant is installed and commissioned.

6.3.5 Sanitary Plumbing & Drainage

Sanitary drainage will be designed to comply with AS 3500.2 – Sanitary plumbing and sanitary drainage.

The additional wet areas to the new development will be drained by single stacks located in close proximity to these areas. The existing sewer connection to the Millet Street Sydney Water Sewer main will need to be assessed by a Sydney Water coordinator to determine if it can cater for the additional sewer load. Made under a section 73 application.

Sanitary fixtures constitute a major cost component of Hydraulic services and should be selected to achieve the following criteria:

- Function

- Aesthetics
- Durability
- Vandal and breakage resistance (to the degree possible)
- Clean lines
- Sealed to wall and floor surfaces
- Ongoing availability of parts and services
- Watermark compliant

6.3.6 Fire Hose Reels

The existing Fire Hose Reel system is installed to a previous code that is non-compliant to the current NCC and requires upgrading to AS 2441. Each Fire Hose Reel shall be located along the normal paths of travel to an exit. Additional Fire Hose Reels will be required to protect the additional development.

6.3.7 Fire Hydrants

The current fire hydrant system is non-compliant as it will require upgrading to comply with the NCC and AS 2419.1-2005. The fire hydrant booster assembly needs to be relocated 10 metres from the building and substation. The existing fire hydrant pump needs to be replaced with a diesel pump and housed in a new cold water and fire hydrant pump room located a minimum 6 metres away from the building.

6.3.8 Portable Fire Extinguishers

The existing building is serviced with extinguishers. New and refurbished areas will be designed to AS 2444-2001

6.3.9 Roof Drainage

Roof rainwater collection systems shall be designed to handle a one in twenty year storm event, over a six minute duration, rainfall data will be reference from the Bureau of Meteorology statistics.

Consideration will be given to ways of preventing leaf build up in gutters to prevent building damage and service interruption due to gutter overflow.

Box gutters shall only be considered where eaves gutter cannot be utilized, all box gutters are designed for the one in one hundred year storm event and incorporate robust overflow strategies that will not compromise the building.

7 VERTICAL TRANSPORTATION SERVICES

7.1.1 General

Two (2) stretcher and disable capable machine room less electric traction lifts will be provided and will be as follows:

7.1.2 Requirements

2.3	DUTY:	1.0 m/s
2.4	PASSENGER:	13/14 stretcher and disable capable lift
2.3	FLOORS SERVED AND TRAVEL:	5 levels.
2.4	SHAFT SIZE:	Clear internal dimensions 2,450 long x 2,000 wide,
2.5	STOPS AND OPENINGS:	Lift stops with openings at the front of the lift shaft
2.6	Lift Motor Room:	No Lift Motor Room.
2.7	POWER SYSTEM:	Electric Traction.
2.8	CONTROL:	The lift control shall be electronic solid state micro processor based. The controller shall incorporate self diagnosis faults with fault indication fitted.
2.9	INTERNAL CAR FINISHES:	Ceiling - Painted flat white
		Walls - Stainless Steel
		Front Wall - Stainless Steel
		Doors - Stainless steel
		Floor - Tile. 300x300 mm vitrified tiles. Natural stone + tiles.
		Lighting - Downlights
		Ventilation - Ventilation Fan
		Rear Wall - Mirror and Stainless Steel
		Handrail - 60 mm diameter stainless steel tube
		Skirting - Stainless Steel

2.10	TELEPHONE:	To be in included in lift car and wired to the telephone termination point. The communication telephone set is to be push button operation with auto dial operation. The auto dialler is to be provided as part of the contract. Auto dialler is to be set to ring lift company or 24 hour site manager.
2.11	CAR CONTROL PANEL:	Tactile and laminated micro touch buttons set into a panel. Installed to comply with AS 1735 part 12 for disabled operation. Buttons to be inscribed to international standards. All control panels shall be complete with Braille tactile indications
2.12	CAR WIDTH AND DEPTH:	1,100 width , 2,100 depth
2.13	PIT AND HEADROOM:	1,400 pit, 4,150 headroom
2.14	CAR DOORS:	Fully automatic, power operated, centre-parting horizontal sliding, with a clear opening of 1,000 mm wide and 2100 mm high.
2.15	LANDING DOOR AND FRAME FINISH:	Stainless steel
2.16	PASSENGER:	IDAS (Infrared Doorway Area Scanner)
2.17	LANDING BUTTONS:	Illuminating symbols located in a Brushed Stainless Steel faceplate positioned adjacent to the main landing entrance, landing panel to include dot matrix position with direction of travel arrows.
2.18	ACCESS TO PIT:	Steel ladder to pit by lift manufacturer.
2.19	LIGHTING:	Downlights with emergency battery inverter pack fitted to provide four (4) hours operation of one light upon mains failure. Provide fluorescent lighting in lift shaft. Provide general purpose outlets.
2.20	HAND RAIL:	Full length of side adjacent to the control panels and at a height of 900 AFFL.

2.21	LIFT WALL PROTECTION:	Provide one (1) set of removable protective lift wall covers, install fixings around the lift ceiling perimeter.
2.22	LIFT GUIDES:	The lift guides mechanism shall be of the roller type with fish plate guide rails.
2.23	CAR HEIGHT:	2,400 height (Finished false ceiling 2,250).
2.24	LIFT OPERATION IN FIRE CONDITION	Under Fire conditions the lift operation shall be in accordance with SAA lift code

8 Environmental Sustainable Design Principles

Environmentally sustainable design principles will be considered and incorporated during the design stage for all building services. Recommendations for consideration in the Architectural design have also been included.

The ESD initiatives will consider the following broad principles:

- Energy – reduction in energy consumption;
- Water – reduction in potable water usage;
- Materials – selection of environmentally friendly materials in construction and fitout;
- Indoor Environment Quality – improvement of the indoor environment and well-being of occupants

8.1 Mechanical Services

The following outlines a number of ESD initiatives that may be considered as part of the proposed mechanical services design:

- Gas-fired heat pump hot water system is proposed to provide space heating. Typical gas-fired heat pumps have significantly higher efficiencies than gas boilers.
- Carbon dioxide (CO2) monitoring and control to reduce introduction of outside air into unoccupied areas
- Air to air heat exchanger to recover energy from exhaust air systems
- Office areas and 24-hour patient areas will be designed with separate systems to enable office area air conditioning to be shut down outside of office hours;
- Localised air conditioning systems to serve intermittent use areas such as Meeting, Activity and Dining Rooms etc.
- Ultraviolet (UV) air filtration will be provided to improve indoor air quality, provide air disinfection, minimise the airborne nosocomial infections, control growth of mould and fungus and to reduce energy consumption via improvement to the coil performance.
- High efficiency chillers utilising refrigerants with zero ozone depletion potential;
- Variable speed drive (VSD) fans and pumps to the chilled water system; and
- Provision of a Building Management Control System (BMCS) to enable monitoring and central control of the Mechanical, Hydraulic and Electrical systems

8.2 Electrical Services

The following outlines a number of ESD initiatives that may be considered as part of the proposed electrical services design:

- Energy efficient lighting including T5 and LED fittings to be incorporated throughout the building
- Lighting control solutions will be provided based on ambient lighting conditions including perimeter photoelectric cell, dimming systems, motion sensors, time-clocks and addressable lighting
- Energy metering to appropriate uses, in accordance with the Building Code of Australia, to facilitate monitoring of energy consumption
- Photovoltaic panels

8.3 Hydraulic Services

The Hydraulic Services design will reduce the consumption of potable water through the selection of efficient water fixtures (WELS rating) and fittings.

Consideration could also be taken into providing a rainwater harvesting system for toilet flushing and landscape irrigation.

8.4 General Services Considerations

All building services should give consideration to:

- Specification of low VOC paints, sealants and adhesives where services are exposed to the indoor space
- Where PVC is specified, require that PVC comply with the Best Practice Guidelines for PVC in the Built Environment
- Specification of acoustic and thermal insulation that avoids the use of ozone depleting products in manufacture and composition

8.5 Architectural and Landscape

In addition to the Building Services, consideration to the following items should be given in the Architectural design to improve indoor environment quality and to reduce energy and water consumption.

The selection of architectural elements including finishes, furniture and other building elements could consider the building's indoor environment quality, the well-being of occupants and the impact on the environment from building materials.

The following environmentally responsible approach to the architectural design could be considered:

- Maximise natural light to all appropriate areas, and provide glare control devices such as blinds and/or external louvres.
- Specification of low VOC content paints, sealants and adhesives, carpets and flooring
- Specification of composite wood products with low formaldehyde emission levels
- Selection of furniture (tables, chairs, joinery) with good environmental credentials eg. EcoSpecifier GreenTag, Good Environmental Choice Australia (GECA)
- Specification of recycled or reclaimed timber, or timber sourced from well managed forests where used;
- Selection of energy efficient dishwashers, fridges, freezers, clothes washers and dryers where suitable
- Selection of water efficient dishwashers and clothes washers where suitable
- Specification of PVC which adheres to Best Practice Guidelines where PVC is used,
- Specification of acoustic and thermal insulation that avoids the use of ozone depleting products in manufacture and composition

The landscape design should also consider:

- Selection of plant species that are low-water usage and appropriate to the site climatic conditions; and
- Efficient irrigation system including sub-soil drip feed system and rainwater supply.