WOOD & GRIEVE ENGINEERS

Bowral & District Hospital Main Works Redevelopment (SSD 8980)

Electrical, ICT and Security Services Report

For the State Significant Development Application

Prepared for:

Health Infrastructure
c/o ADCO

Date:

03 September 2019

Prepared by:

Steven Brims

Project No. 29586-6-SYD-E

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0	21/11/2017	Preliminary Issue	Rowan Barwood
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3	20/12/2017	Final Issue	Rowan Barwood
4	31/01/2018	Final Issue	Rowan Barwood
5	04/05/2018	Final Issue	Rowan Barwood
6	03/09/2019	Updated to include level 2 expansion	**Steven Brims**
7	**20/09/2019**	**Updated to include level 2 and 3 Expansion**	**Steven Brims**

1. Executive Summary

This report is an update of the original SSDA application with the below scope of works to the Electrical services within the expansion of level 2 and 3.

The scope of the Main Works redevelopment includes:

- level 2 Expansion to allow for CSSD and Pharmacy to be transferred from current Hospital location to the new building
- Level 3 Expansion for additional Services plant to services CSSD and Pharmacy area

The major issues with respect to site infrastructure detailed in this report include:

1. As part of the Level 2 and 3 Expansion no impact to the new 1000kVA padmount substation is required the substation has sufficient capacity to provide the additional load for the CSSD and Pharmacy area
2. As part of the Main Works, the level 2 and 3 Expansion the new main switchboard has been increased in size to provide the required 30% spare capacity including the new supplies for CSSD and Pharmacy
3. As part of the Main Works, level 2 and 3 Expansion and Essential power requirements for CSSD and Pharmacy the original Generator size has increased from 350kVA to 600kVA.
4. As part of the Main Works, Level 2 and 3 Expansion the proposed original UPS system remains the same as has sufficient spare load to accommodate the CSSD and Pharmacy power requirements
5. As part of the Main Works, Level 2 and 3 Expansion a new distribution boards will be located within the new fire compartment as per requirements of the Engineering Services Guidelines to suit the new departments.
6. As part of the Main Works, services to the new building will be provided as follows:

- Emergency Evacuation Lighting –the level 2 and 3 Expansion will have additional emergency lighting required and connected to the new building system.
- Mobile Duress – level 2 and 3 Expansion will have Mobile duress capability and connected to the new building original designed system
- Wireless Telephony – Level 2 and 3 Expansion will be an extension of the new building system
- Mobile Distributed Antenna System (including GRN) – Level 2 expansion will be included in the DAS design for the rest of the building
- Patient Entertainment System – Level 2 and 3 Expansion will have an extension of the new building MATV system
- Access Control System –Level 2 and 3 Expansion security requirements will be an extension to the new building Inner Range (Integriti) security system
- Fixed Duress – Level 2 and 3 Expansion will be provide with fixed duress where Hospital Staff nominate during the detailed design stage
- Nurse Call System – Level 2 and 3 Expansion will have the Rauland nurse call provided where required
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2. Introduction

2.1 General

This Electrical Development Statement has been prepared on behalf of NSW Health Infrastructure to accompany a Section 4.55 application to modify State Significant Development 8980 which was approved by the NSW Department of Planning, Industry and Environment on 21 February 2019 (SSDA approval). The SSDA approval was for the redevelopment of the Bowral and District Hospital, located at Nos 97-103 Bowral Street, Bowral within the Wingecarribee Shire local government area.

NSW Health Infrastructure is seeking to lodge an application to modify the SSDA approval to capture minor changes to Levels 2 and 3 of the Hospital. The modifications can be summarised as follows:

Level 2

Additional Level 2 floorspace to accommodate hospital service rooms and back-of-house facilities (including a Central Sterilising Department (CSD), pharmacy, and bathrooms);

Additional 317.52 sqm CFA;

Minor changes to roof pitch and building elevations; and

Minor changes to cladding and facade treatment (including external materials and finishes).

Level 3

Extend Level 3 floorspace to accommodate plant room and an additional egress point;

Additional 176.4 sqm CFA;

Suspended walkway over the roof; and

Minor changes to external materials and finishes.

2.2 Basis of the Report

- Site visits carried out by Wood & Grieve Engineers.
- Services Drawings viewed on site for the various buildings.
- Architectural drawings produced by McConnel Smith & Johnson.
- Design Team Meetings.
- South Western Sydney LHD ICT Strategy document
- HI Engineering Services Guidelines Aug 2016
- HI Design Guidance Notes 1-33

2.3 Limitations of the Report

This report is based on the above information, investigative work carried out by WGE and drawings and information provided by the Local Health District, McConnel Smith & Johnson Architects and Bowral & District Hospital Facilities Managers.

WGE have based our report on the assumption that the information provided can be taken at face value and in general terms accurately reflect the installation on site.

WGE does not accept any liability in regards to the accuracy of the existing documentation.

Introduction

WGE's site visit involved a walk around the site, and an overall visual inspection. As such, this report should be read with the limitation of such a site visit in mind. Only items visible were considered and where buildings were not being affected as part of the new works the investigation of the building was cursory only.

The investigation did not include a complete examination of all buildings, WGE did not investigate any non-visible aspects of the installation, and WGE did not physically verify the capacity of any installed systems.

3. Design Criteria

The Electrical Services will comply with but will not be limited to the following relevant codes and standards:

NSW Health Engineering Services Guidelines (August 2016)

Australasian Health Facility Guidelines

NSW Health ICT Cabling Standard

NSW Health Wi-Fi Standard

Building Code of Australia 2016

Service and Installation Rules of New South Wales

Australian Standards

1158	Lighting for roads and public spaces
1680	Interior lighting
1768	Lightning protection
1940	The storage and handling of flammable and combustible liquids
2067	Substations and high voltage installations exceeding 1 kV a.c.
2293.1	Emergency evacuation lighting for buildings
2381.1 + 10	Electrical equipment for explosive gas atmospheres – Selection, installation and maintenance – General requirements
2500	Guide to safe use of electricity in patient care
2834	Computer Accommodation
3000	Electrical Installations (Wiring Rules)
3003	Electrical installations – Patient treatment areas of hospitals and medical, dental practices and dialyzing locations
3008.1.1	Electrical installations – Selection of cables – Cables for alternating voltages up to and including 0.6/1 kV
3009	Electrical installations – Emergency power supplies in hospitals
3010	Electrical installations – Generating sets
3013	Electrical installations – Classification of fire and mechanical performance of wiring system elements
3100	Approval and test specification – General requirements for electrical equipment
3200.2.41	Medical electrical equipment – Particular requirements for safety – Surgical luminaires and luminaires for diagnosis
61439.1 + 2	Low-voltage switchgear and control gear assemblies
4897	The design, installation and operation of underground petroleum storage systems
5000.1	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV

4. Existing Electrical Services Arrangement

Existing conditions based on site visit carried out by WGE on 27 April 2016, existing drawings viewed on site and information provided by MSJ Architects and Bowral & District Hospital Facilities Managers.

Refer to Concept Design Report dated 15 August 2016 for details.

5. Proposed Electrical Services Arrangement

5.1 Main Electrical Supply

New Substation

The maximum demand of the new building (Main Works) and the Level 2/3 Expansion is estimated at 875kVA (1263A).

As part of the Main Works, a new 1,000kVA padmount substation and associated easements has been provided on the site and has sufficient power capacity to provide the additional power requirements for CSSD and Pharmacy.

The location of the substation shall be selected with due consideration of:

1. Minimum separation distances to combustible building surfaces required by Endeavour Energy standards and recommended by AS 2067.
2. Electromagnetic compatibility.
3. Distance to the new main switchboard.
4. Future expansion space.
5. Proximity to joints in telecommunications cabling.
6. Proximity to fire hydrant booster pump rooms.

5.2 Standby Generator

The generator load of the new building (Main Works) and the Level 2/3 Expansion has been estimated based on the requirements of the NSW Health Engineering Services Guidelines (Aug 2016). The estimated generator load is 450kVA (427kW).

the original generator which was proposed to be installed in an external acoustic enclosure was nominally to have a standby rating of 350kVA (280kW), with the expansion and essential requirements for Mechanical and equipment the generator has increased to a 650kVA (617kW) which also allows for 30% spare capacity.

A new 2940L skid mounted fuel tank is being installed which will provide the 24hrs fuel consumption as per HI Guidelines

The generator would be installed in weatherproof acoustic enclosure.

Generator load allocations have been based on NSW Health Engineering Service Guidelines (Aug 2016) and AS 3009, with a high level summary as follows:

AS 3009

AS 3009 Table 2.1 identifies the extent and classification (delay) of emergency (essential) supplies in for several types of systems and areas. The extent of emergency supplies identified herein comply with the minimum requirements identified in AS 3009.

NSW Health Infrastructure Engineering Services Guidelines Aug-2016

The Engineering Services Guidelines requires standby power to be connected to all critical patient equipment required for critical procedures to allow completion should there be an outage. Standby power is to be provided to all subsidiary mechanical, hydraulic and medical gas systems (which are dependent on an electrical power source to operate) and is essential in delivering services to the critical care areas. Standby sub-mains to be provided with standby generator supply are to be separate from the normal supply sub-mains.

The capacity of the standby generating plant is to be sized to match the diversified maximum demand adjusted to the standby coverage agreed for the project. In determining the coverage of standby power provision, the following principles apply:

- All life and safety requirements as required by the NCC;
- All ICT communications room active equipment;
- Medical air and suction equipment;
- Approximately 30% of lighting and power in all areas. This can vary depending on the number of light fittings and power outlets used in any particular room;
- Full lighting and power in critical areas, which includes emergency, operating theatres, coronary care unit (CCU), intensive care unit (ICU), neonatal intensive care unit (NICU), burns and mortuary. All air handling fans and exhaust fans serving these areas;
- All air handling and exhaust fans serving isolation rooms, central sterile services department (CSSD) and pathology;
- Selected Imaging areas required for emergency departments only;
- Critical storage such as -80ºC fridges and blood fridge;
- Sewage pumping stations if required; and,
- Domestic water pumps if required.

Spare capacity is only to be provided from the difference between the actual “next size” rating of the generator and the calculated standby requirement.

- The generator shall be rated for standby duty;
- The generator shall be able to meet the power load on start up without stalling;
- Large medical equipment loads will need to be considered; and,
- Motor loads shall incorporate delay start up where necessary to diversify the start-up currents over time in lieu of a peak current condition to allow the set to reach satisfactory operating conditions without stalling

5.3 New Main Switchboard

As part of the Main Works, for level 2 expansion the Main Switchboard has increased in number of poles to allow to retain the 30% spare capacity the original design MSB had; the MSB remains as a Form 4A main switchboard will be installed within a new 2-hour fire-rated Main Switchroom in the new building. Automatic transfer switches will be provided within the main switchboard. For monthly testing purposes, synchronised closed transfer trip will be implemented to enable the testing of the generator using the essential load, without load interruption. Means will be provided to connect a temporary mobile generator to supply the essential loads. The main switchboard will be fitted with surge protection.

Consideration must be made of the impact of electromagnetic fields (EMF), resulting from the main switchboard and associated cabling, on adjacent clinical areas, particularly with respect to compliance with the limits mandated by AS/NZS 3003. It is noted that typically the most cost-effective means of compliance is the careful selection of switchroom and submains cable route locations, such that sensitive clinical areas are separated from the principal EMF sources.

5.4 Uninterruptible Power Supplies (UPS)

As part of the Main Works, level 2 Exdpansion will utilize the new UPS system as the current system has the capacity to provide the required load in CSSD and Pharmacy areas

The UPS units will be accommodated in a room having an FRL of 120/120/120 in order to comply with the BCA.

5.5 Power Factor Correction Unit

As part of the Main Works, Level 2 expansion will be on the same PFC/Active harmonic filter system and no additional PFC is required

5.6 Electrical Distribution System

5.6.1 Containment

Level 2 expansion will have additional cable trays installed to reticulate cables round the new expansion area

5.6.2 New Consumers Mains Cables

5.6.3 New Submains Cables

level 2 expansion will have new submains run from the Main Switchboard to new DB’s located within the new CSSD and Pharmacy area

Cabling shall generally consist of copper XLPE insulated cables with different coloured PVC outer sheaths to identify Non-Essential, Essential and Uninterruptible Power Supply (UPS) submains. Submains to essential services will generally not be fire-rated. Submains supplying safety services will be fire-rated where required to comply with AS/NZS 3000.

5.6.4 New Final Circuit Cables

Final circuit cables will be suitably sized to comply with voltage drop allowances as per AS/NZS 3000.

5.7 Distribution Boards

Distribution boards have generally been located per fire compartment.

Distribution boards serving critical care areas shall have a means of transferring supply between the essential and non-essential sections of the main switchboard.

The distribution boards will generally be specified with a Schneider Isobar or similar chassis, which provides Form 4ah segregation.

The switchboard locations are indicated on the drawings provided in the Appendix of this report.

5.8 Power Outlets

Power outlets shall be colour-coded in accordance with AS/NZS 3003 as follows:

1. Non-Essential supply = WHITE
2. Essential supply = RED
3. UPS supply = BLUE
4. Cleaner's outlets = Beige

Each of the circuits will be protected by an RCD, as per the requirements of AS3000 or AS3003.

5.9 Wiring in Medical Treatment Areas

Where electrical services are within or adjacent to body/cardiac protected areas, they will comply with AS/NZS 3003. It is anticipated that Critical Care Unit bays will be cardiac-protected.

Leakage protection devices will generally consist of 10mA residual current devices. Isolation transformers and line isolation and overload monitors will be provided for selected UPS circuits.

5.10 Lighting

Luminaires being proposed will generally consist of LED fittings.

All Lighting will be colour temperature of 4000K within patient areas and 3000K in entrances and spaces which require a warmer feel to the space.

Cyanosis compliant lamps are not proposed to be used in the new building.

The lighting levels will comply with AS 1680, AS1158, NSW Health Engineering Services Guidelines and BCA requirements. The below lighting levels have been allowed for:

1. Stairs - 160Lux
2. Main Entrances – 160Lux
3. Accessible WC – 200Lux
4. CSSD Areas General 240Lux, PC task areas 320Lux
5. Pharmacy 320Lux
6. Corridors 160Lux

5.10.1 Patient Care Areas

Luminaires used in these areas will generally consist of LED CRI>90 luminaires with an easily cleaned diffuser.

5.10.2 General Non-Patient Areas

Luminaires used in these areas will generally consist of LED CRI>85 luminaires with an easily cleaned diffuser.

5.10.3 External Lighting

Luminaires will consist of LED fittings, pole mounted, wall-mounted and soffit-mounted as required. External luminaires will be controlled by PE cells, time clock and/or the lighting control system.

5.10.4 Lighting control

Automatic lighting controls will be provided as an energy-saving measure such rooms as offices, store rooms, cleaner's rooms. Preference will be given to low-cost, easily maintained 240V controls.

Where necessary to provide the required functionality, a lighting control system utilising DALI will be implemented.

It is anticipated that a lighting control system will be provided to control the lighting in the following areas:

1. Public corridors (between departments);
2. Inpatient wards (corridors only);
3. Stairs
4. Selected imaging rooms.

5.11 Emergency Evacuation Lighting

Level 2 Expansion will have the New building emergency lighting and exit signs provided to comply with AS/NZS 2293.1. Emergency lighting will additionally be provided in the following areas:

1. Stairs/Toilets/Change rooms
2. Rooms greater than 120m2 that are accessible to patients
3. Staff areas where public address announcements are made
4. Plantrooms
5. CSSD Area
6. Pharmacy Area

the Clevertonics computer monitored system will be provided for emergency lighting in the new and level2/3 expansion. Luminaires incorporating lithium-ion batteries with a minimum 5-year warranty are highly recommended due to the favourable whole-of-life comparison with nickel cadmium / nickel metal hydride batteries.

5.12 Telecommunications Cabling Installation

5.12.1 Horizontal Cabling

Horizontal cabling, patching and labelling will be as per the requirements of the NSW ICT Cabling Standard and SWSLHD Generic Cabling Specifications (Jun 2017).

Horizontal cabling will generally consist of Category 6A/Class EA F/UTP or U/FTP (screened) horizontal cabling system.

The route length of all horizontal cable runs from the communications rack patch panels to the telecommunications outlets will not exceed 90m. Horizontal cabling will cross other runs of cables at ninety (90) degrees wherever possible.

All pairs of all horizontal cabling will be terminated at both ends and will be installed to avoid stretching, kinking, tight bends and damage from adjacent fixtures or plant.

Telecommunications outlets will be provided mounted to the ceiling to support wireless access points. Heat mapping is to be conducted during Design Development.

5.13 Information and Communications Technology (ICT)

5.13.1 Telephony

A new standalone VoIP system incorporating a Cisco Unified Communications Manager (CUCM) cluster will be provided to the new building. The new and existing PABX systems will be interfaced to enable both to operate on the site, until the existing PABX system is eventually phased out.

A small number of PSTN telephones, which will be capable of operating in the event of a power failure to PoE switches will be provided.

5.13.2 Wi-Fi Network

level 2/3 expansion will be provided with Wi-Fi coverage throughout. The system will support RTLS and Wi-Fi telephony services, including mobile duress alarms.

The project is to conduct heat mapping of the new building during Design Development, which the SWSLHD will sign-off.

The SWSLHD have advised that all new WAPs are to be provided with a single RJ45 data outlet.

5.13.3 Mobile Duress

A Wi-Fi based mobile duress system is proposed to be installed in the new building where required.

Heat mapping to be conducted during Design Development shall take into account the coverage required for Mobile Duress.

5.13.4 Wireless Telephony

Mobile Voice over Wi-Fi is proposed to be provided to take advantage of the Wi-Fi network. Interoperability of devices between the new building and existing buildings will need to be addressed. Replacement of existing DECT services with VoWiFi services may be an option; however, this may result in additional costs outside of the current projects scope.

5.13.5 Mobile Distributed Antenna System (DAS)

Installation of a Mobile Distributed Antenna System within the new building has been proposed as a VE item. If funds are available it should be added back into scope.

Construction of the MDAS room and provision of conduits shall only be provided should the MDAS system remain a VE item.

The MDAS room shall be large enough to cater for all the major providers.

A coverage (desktop) assessment report should be compiled by an RF specialist to determine if DAS is required within the new building.

The MDAS system would be designed, supplied and installed by a specialist RF designer and installer subcontracted to the main works contractor. The antenna system would be owned by NSW Health. Carrier equipment would be installed in a designated room on Level 3 of the new building and this equipment would be maintained and owned by the carriers. The carriers would connect to the MDAS system within the same room and would share the common distributed antenna system infrastructure to distribute their services to the building, under terms agreed for shared facilities in the Mobile Carriers Forum (MCF).

5.13.6 Patient Entertainment System

level 2 expansion will have coaxial-based Free-To-Air TV Patient Entertainment system where required.. Each TV/PES location will be provided with one (1) double general power outlet, one (1) Type F coaxial outlet and one (1) RJ45 Cat 6A data outlet. The provision of a data outlet at each of these points will allow the LHD to install an IP based Patient Entertainment System in the future or allow each of these locations to have eMR functionality.

5.13.7 Audio Visual Systems System

No Additional AV requirements are required for the level 2 expansion

5.13.8 2-Way Radios

No expansion requirements for the current 2-way Radio system.

5.14 Security Systems

5.14.1 Access Control System

Level 2 expansion will utilise the new Inner Range (integrity) system for the access control in CSSD and Pharmacy areas

5.14.2 CCTV Surveillance

New IP CCTV will be provided where required (locations to be discussed with Hospital staff during detailed design stage) the additional cameras will be connected the new building system with the current data storage allowing for additional cameras to be added with no upgrades required

5.14.3 Fixed Duress Alarm System

Level 2 expansion will be provide fixed duress as required (locations to be discussed with Hospital staff during detailed design stage) the additional duress locations will be added onto the security system.

5.15 Intercom Systems

level 2 expansion will be provided with additional intercom where required (locations to be discussed with Hospital staff during detailed design stage) the new intercoms will be added on the new building IP system

5.16 Nurse Call System

5.17 level 2 expansion will be provided with additional nurse call where required (locations to be discussed with Hospital staff during detailed design stage) the new outlets will be connected on the new building nurse call systemLightning Protection System

With the new level 2 expansion requiring the roof to be extended the lightning protection current design will need to change to incorporate the new roof structure.