MILTON ULLADULLA HOSPITAL – CT IMAGING AND CANCER CARE

DESIGN DEVELOPMENT REPORT

ELECTRICAL & ICT SERVICES

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DOCUMENT CONTROL SHEET

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CONTENTS

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

This Milton Ulladulla Hospital Campus is an existing regional hospital located in Milton, on the South Coast of NSW, it serves the communities of Milton, Ulladulla, and the surrounding areas. The project comprises of two separate scoping items, as further detailed below.

Scope Item 1 – Refurbishment of the cancer care house and an additional single bedroom with ensuite, new consult rooms, storage spaces and relocation of the reception near the main entry.

Scope Item 2 – Expansion of X-ray room including the design of a new combined CT and X-ray control room, along with the relocation of medical panels, hand wash basin, and Unistrut to align with the new X-ray setup.

This Design Development Report forms part of the Contract and shall be considered by the tenderer's when scoping and pricing the project. This documentation shall be read in conjunction with the project Electrical Specification and Drawings, to facilitate understanding of the required scope and in the completion of Design Finalisation and site required site investigations and planning.

This Design documentation looks to progress from the earlier Master Plan and Concept Design stage of the project by undertaking the following key items:

- Developing a design strategy for the electrical and communications infrastructure serving the proposed expansion.
- Outlining the proposed infrastructure methodology for the electrical, ICT requirements of the project.
- Outline specific design finalisation elements, in addition to the general design finalisation requirements of the contractor.
- Development of design and development level drawing package which focuses on site infrastructure, main electrical systems, electrical schematics.
- Close coordination with the overall project team, particularly the architect, for spatial coordination of all main electrical room/cupboard and infrastructure throughout the fitout.

The electrical and ICT services design has been developed to the Design Development level and as such is part diagrammatic and further design is required to design finalisation.

This report is required to be read in conjunction with the associated electrical documentation which form part of this package, including the appendices to this report, electrical drawings, and the electrical technical specifications.

1.2 CT IMAGING FITOUT OVERVIEW

The medical imaging scope of works comprised of the refurbishment of the existing MUH imaging X-RAY room, expanded into a new combined X-RAY and CT imaging suite.

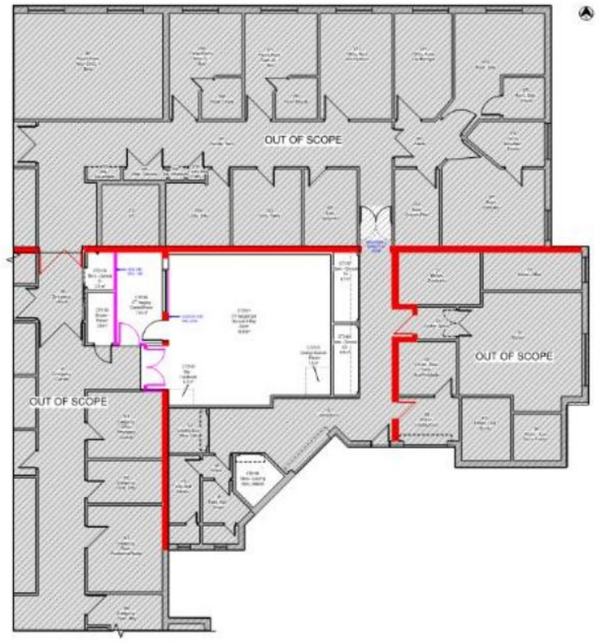

Figure 1 Proposed Scope Area – Medical Imaging

1.3 CANCER CARE UNIT EXPANSION OVERVIEW

Refurbishment of the cancer care house and an additional single bedroom with ensuite, new consult rooms, storage spaces and relocation of the reception near the main entry.

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Figure 2 Proposed Scope Area – Cancer Care

2. PURPOSE OF THE REPORT

The purpose of this document is to outline the following:

- The nature, condition and compliance of the existing site electrical and ICT services infrastructure and its suitability to accommodate the proposed works.
- Preparation of electrical and communication distribution strategies to support the proposed new works.
- Proposed strategies for the interfacing of electrical and ICT systems with the existing campus services.
- The nature, location, condition and compliance of the existing site electrical and communication services infrastructure and its suitability to accommodate the proposed development works.

It should be noted that this report has been prepared with information developed by site visits, review of previously prepared reports and designs and review of available as built documentation.

In preparing this report, the following items have been considered:

- Capacity and condition of existing infrastructure elements and their suitability for retention.
- The impact of the proposed demolition works.
- The need to maintain functionality of the Hospital at all times. Note, careful consideration of the staging will need to take place for this to be achieved.
- Capital Costs
- Project program
- Integrity of infrastructure
- Services maintainability
- Compliance with NSW Health's "Engineering Services Guidelines (ESG)", NSW Health ICT Cabling Specification and the full suite of technical design notes & Standards

It should be noted that this Detailed Design report has been prepared with information sourced from information available to date such as current architectural details developed to date. Should additional information become available after the release of this report it will be addressed within the Design Finalisation stage of the project. This document will continue to become more refined and detailed as it leads into becoming the future Design Development report. It shall be noted that at this stage of the design development, architectural RLS or RDS information has not been finalised. It is expected that this information will be provided in the next stage of design finalisation.

As the design still has several important elements (specifically listed below) have not yet been addressed. These items are important to the delivery of the overall project and will be addressed in further detail as the project enters the design finalisation phase. The following list highlights the major items, however in non-exhaustive:

- Negotiations with supply authority including application for connection for increased load. It is a requirement of the successful tendered to complete this during design finalisation at the earliest opportunity.
- Ongoing liaison with the LHD (Engineering staff and specialist ICT personnel).
- Coordination with architectural RLS and RDS.
- Coordination with other architects, services and other consultants, particularly for ceiling and in ceiling services.
- Input from any BCA or Fire engineering requirements and reports or updated to reports previously provided and referenced.
- Detailed review and survey of existing services provisions such as existing electrical cabling and ICT backbone cabling.
- Reticulation pathways for proposed cabling..

The following report references two scopes of works for Milton Ulladalla Hospital and the following nomenclature has been used to differentiate between these two scopes:

- CT Imaging
- Cancer Care Unit

Any section(s) of this report which does not use the above nomenclature will be considered as a general scope of works that will be completed in both projects.

2.1 DETAILED DESIGN DRAWING LIST

A transmittal of drawings that accompany this detailed design report is attached as:

- CT Imaging: Appendix A
- Cancer Care: Appendix D

3. PROJECT OVERVIEW

3.1 INTRODUCTION

The existing Milton Ulladulla Hospital site is located at 106 Princes Hwy, Milton NSW 2538 and services primarily the Milton Ulladulla district within the Shoalhaven region in NSW. The existing hospital is a 24-hour health facility which provides several key health services to the public including an Emergency Department, Medical imaging, Maternity and Women's Health, Aboriginal Health and more.

The following is a summarised overview of the works:

- Decommissioning of existing electrical and communication services in the existing footprint as defined in the architectural documentation.
- Upgrades, alternations and new electrical and ICT services to the new fitout.
- Existing areas outside of refurbishment footprint are to remain operational for the duration of construction works.

Figure 3 Satellite View (Google Maps)

3.2 REFURBISHMENT/ REPURPOSING

The proposed contracted works areas are to undergo refurbishment to accommodate the new fitout areas.

The existing Block B electrical and ICT infrastructure are proposed to be retained and expanded to accommodate the proposed refurbishment space. Likewise, the existing Floor Distributors (FD's) will be utilised in this scope of works, including the additions of any required ICT and other systems located within these spaces. It is a strict requirement that all proposed works and modifications to these existing spaces to support the new fitout are coordinated with the relevant ICT stakeholder including ISLHD ICT and facilities teams.

Other systems that will need a level of integration / expansion include nurse call, CCTV surveillance, MATV, Patient Entertainment, electronic access control, intercoms and the like. Expansion of these systems into the new fitout will require detailed assessment of those systems to determine both adequacy and capacity to support the MUH refurbishment works. Expansions to those system will be required.

ELECTRICAL SCOPE OF WORKS

The scope of electrical works is broadly summarised as follows:

NOTE: Some scope items are specific to the CT imaging scope of works, and are highlighted below. These typically related to the electrical infrastructure scope of work, which is included in the Medical Imaging overall scope.

- Make safe, demolition and removal of existing electrical services within the nominated demolition scope area.
- Augmentation, modification of existing electrical and communications systems (including all sub-systems) i.e. nurse call, CCTV security) within this scope
- Removal of all existing redundant cabling back to point of supply
- Tidy up of existing services that are exposed/accessible in these works' areas
- New generator and control system **(CT Imaging Scope)**
- New generator switchboard **(CT Imaging Scope)**
- New site main switchboards **(CT Imaging Scope)**
- Upgrades to existing site main switch room to latest compliance **(CT Imaging Scope)**
- Back feed / re-supply of existing MSB to be retained. Existing smaller generator to be retained. **(CT Imaging Scope)**
- Consumer mains alterations/modifications to supply new site MSB. **(CT Imaging Scope)**
- Submains
- External reticulation and trenching **(CT Imaging Scope)**
- Subcircuits
- Protection devices
- Cable management & support systems
- New local UPS system to support the CT Imaging fitout **(CT Imaging Scope)**
- UPS support (General Outlets)
- Detailed survey and assessment of existing conditions
- Metering (Private)
- Medical service panels
- Body protected areas
- CCTV Surveillance
- Fixed Duress Alarm
- Intercom systems
- General power distribution, inclusive of power to other trades
- General lighting and associated controls
- Emergency & exit lighting
- Predictive WAP/WIFI survey to site specific requirements
- Structured voice/data cabling
- Electronic Access Control
- Training
- 12 months defects liability period, warranty and preventative maintenance.
- Fire rating treatment of all related penetrations
- Smoke seals as required
- Acoustic treatment and sealing
- Occupation and Maintenance Manuals
- As built Drawings
- Certification
- Testing and Commissioning.
- Coordination and provisions aligned with AUSHFG and Architects RLS/RDS

- Throughout this report:
  - 'ESG' refers to the Engineering Services Guidelines, March 2023
  - Group 1 items will be both supplied and installed by the Contractor
  - Group 2 items will be supplied by the Client and installed by the Contractor
  - Group 3 items will be supplied and installed by the Client.

  This simple nomenclature is complicated somewhat by the fact that some Group 1 systems need to interface with Group 3 systems. Interfacing responsibility will be on a case-by-case basis as listed in the following report content. To this end refer to the ESG ICT Related Infrastructure Grouping / Responsibilities List located within this report.

4. PRIMARY STANDARDS AND REGULATIONS

Australian Standards	
Electrical Installation	AS/NZS 3000
Electrical Installation – Patient Areas	AS/NZS 3003
Electrical installations - Selection of cables	AS/NZS 3008
Earthquake Loads	AS 1170.4
AS/CA S009 Installation requirements for customer cabling (Wiring Rules)	AS/AC S009
Interior lighting – Safe movement	AS/NZS 1680.0
Interior and workplace lighting – Specific applications – Circulation spaces and other general areas	AS/NZS 1680.2.1
Interior and workplace lighting – Specific applications – Hospital and Medical Tasks	AS/NZS 1680.2.5
Control of Obtrusive Lighting	AS 4282
Emergency evacuation lighting for buildings – System design, installation and operation	AS/NZS 2293.1
Authorities	
National Construction Code (NCC) 2022	
NSW Service and Installation Rules	
NSW Fire Brigade	
Endeavour Energy Network Standards (where applicable and relevant)	
Carrier Services, including NBN	
Client Standards	
NSW Health Infrastructure Engineering Services Guidelines (ESG)	March 2023
NSW Health Cabling and Rooms Standard	Jul 2024
NSW Health, Protecting People & Property	
All relevant NSW Health Design Guidance Notes	
Health Suite of Documents	

The contractor is obligated to comply with the above standards. Where a conflict with the design documentation is identified, the above client standards will generally take precedence; however, it is the contractor's responsibility to flag any perceived ambiguities or conflicts during the Tender Phase.

Any departures from these standards as required, shall be identified and communicated the project stakeholders for review and endorsement.

5. GENERAL REQUIREMENTS & DESIGN BASIS

5.1 GENERAL

JHA Engineers has been engaged by NSW Health infrastructure to provide an electrical infrastructure review and report for the existing Milton Ulladulla Hospital (MUH) campus, with the primary purpose relating to proposed works for the expansion of Medical Imaging facilities and Cancer Care Unit within the hospital.

This section identifies the key scope of works, key design intent criteria required for the development and discusses sources consulted/reviewed to provide the basis of the design herein.

5.1 PRIMARY STANDARDS AND REGULATIONS

Primary Standards and regulations have been outlined in the electrical specification. Please refer to the electrical specification for further details.

5.2 DESIGN BASIS

When compiling this Detailed Design Report, multiple sources were used to form our design basis. These sources include the following:

- Design team workshops with ICT Team
- Site visits and inspections
- Limited Workshops and Presentations
- Limited Consultation with HI and LHD ICT representatives.

5.3 ARCHITECTURAL PLANNING

Note that the clinical planning of the fitout is still underway at the time of preparing the electrical Detailed Design Package and associated drawings. Therefore, some additional engineering planning of the electrical infrastructure will be necessary during the Design Finalisation period.

It is stressed this is considered a normal evolution of the design and that such ongoing planning from the Architect should not impact on the current electrical planning philosophy.

5.4 DESIGN LIFE

- All electrical ICT plant will be new and of robust construction to ensure the following minimum design life:

Item	Minimum design life (years)
Main Switchboards	20
Distribution boards	20
Sub-circuit Cabling	25
Luminaires	15
Emergency Lighting Batteries/ Single Point Luminaires	5

5.5 MAINTENANCE PHILOSOPHY

When planning the electrical site infrastructure, careful consideration has been given to minimising cable reticulation lengths and to ensure the future ease of maintenance (within the constraints of clinical planning). This is particularly the case for major electrical infrastructure such as, main switchboards and generator switchboards .

Internal electrical infrastructure (main switchboards) will predominantly be modular in its nature and smaller than the external infrastructure. On this basis the plant will be readily accessible for maintenance or replacement via double door openings into the circulation areas and by skating the equipment in/out of rooms.

It is proposed to re-use other minor electrical and ICT infrastructure (i.e. EDBs and ICT rooms) which and are currently readily accessible from circulation areas.

6. EXISTING SITE INFRASTRUCTURE

6.1 ELECTRICAL SUPPLY AND AUTHORITIES

6.1.1 EXISTING SUBSTATION

The MUH campus is currently located within the Endeavour Energy supply authority footprint and is supplied via and existing Pad Mount 500kVA external substation (no. 23356) located within the property boundary on the easter side of the site, adjacent the existing car park. The HV supply for the substation is reticulated underground from Gumley Lane to the north of the existing site.

The following table is a summary of the information received by Endeavour Energy in response to an enquiry :

Substation 23356	
Substation Type:	External Padmount/Kiosk
Asset Number:	23356
Substation Capacity	500kVA
Connected Customers	(1-off) – MUH Hospital
MDI Read Date	Feb 2024
Maximum Demand (Occurred Feb 2024)	146kW (165kVA), 32% of nameplate substation capacity

The existing connection details to the site have been confirmed by Endeavour Energy. The site is supplied by a single existing LV connection and consumer mains cable from the LV panel of the substation. The existing consumer mains is protected at the substation by an existing 1250A MCCB, the downstream Service Protection Device has been noted as set to 800A.

It is proposed that the substation is to be retained and re-used for the electrical supply for this project

6.2 EXISTING MAIN SWITCHBOARD

6.2.1 LOCATION AND DETAILS

The MUH site has an existing Main Switchboard (MSB) located within an existing electrical switch room in the existing campus main building, on the Lower Ground level (highlighted in Figure 4 below). It is understood, based on existing documentation review and on-site investigation, this is the only MSB supplying the site.

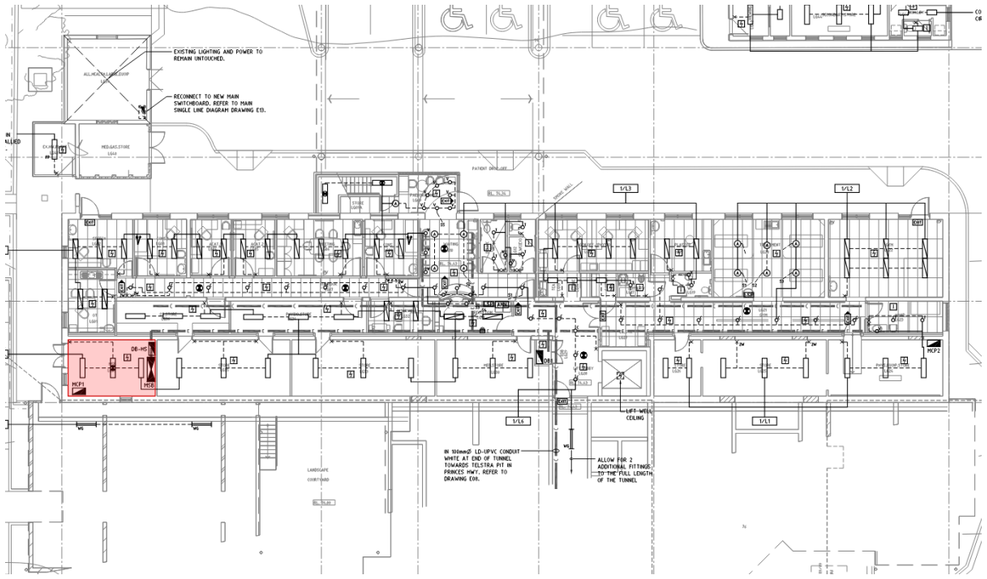

Figure 4 Location of Existing Site Main Switchboard

The existing MSB is supplied directly from the existing Endeavour Energy 500kVA pad mount substation (No. 23356). A Service Protection Device (SPD) was noted as installed based on site investigation and review of existing documentation. The existing SPD is noted as rated at 800A.

The existing MSB was constructed in September 2004 and built to the previous switchboard compliance code AS3439. Based on JHA review of existing information and on-site investigation, the switchboard is noted generally in good operating condition. It was noted on site, the existing MSB underwent Thermal Imaging assessment dated November 2022, although these results are currently not available for review.

The MSB contains several outgoing distribution sections, comprising of Non-Essential (Normal Supply), Essential (generator backed supply) and a Life Safety Services section (also currently generator backed). Each section supplies several downstream distribution boards across the existing main building and other smaller buildings on site.

Through review of existing documentation, and investigations on site, several modifications appear have taken place to the existing MSB, which has altered its original condition and functionality. To impact of these modifications have been listed below:

- Provided generator backup to all sections of the distribution board
- Limited the overall capacity of the existing normal supply MSB capacity to 250A

For further information on the modification to the existing board refer to Appendix G.

Due to impacts of these modifications, it is proposed that a new Main Switchboard is to be installed to support the new medical imaging CT requirements.

Figure 5 Existing Site Main Switchboard Connected to Substation 23356

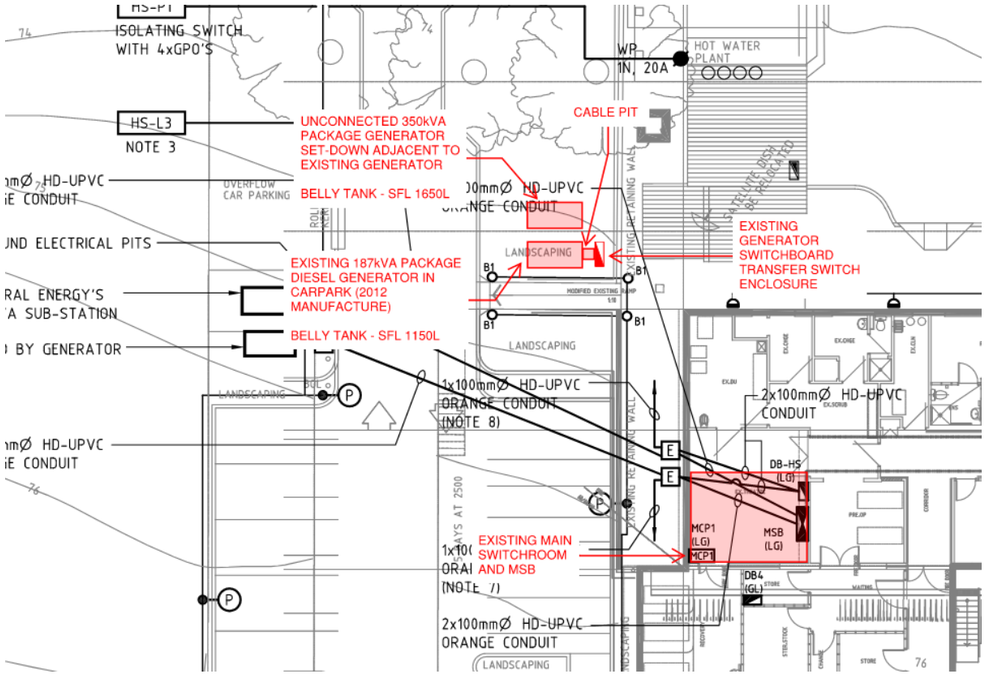

Figure 6 Existing Generator System Locality Plan

6.3 EXISTING GENERATOR SUPPLY SYSTEM

6.3.1 LOCATION AND DETAILS

The existing MUH campus has an existing generator supply system providing essential power to several existing services.

The existing generator is noted as a 185kVA Powerlink GMS175CS-AU packaged unit configured in backup arrangement and is connected to the existing site MSB through a dedicated external Generator Transfer Switchboard. It is understood this external connection switchboard facilitates the connection of a temporary generator should the main generator be under failure or maintenance.

According to nameplate data witnessed on the generator, the existing package unit was manufactured on the 20th of September 2012 and is understood to have been installed in 2014.

The existing 185kVA generator is connected to the existing switchboard through an Automatic Transfer Switch (within MSB) and is controlled and operated by an existing generator control system. In the event of main power failure, the generator is programmed to operate and provide power to the site.

Figure 7 Existing 185kVA Genset (Right), Existing Spare 330kVA Unconnected Genset (Left) and MTS Transfer Switchboard (Behind)

An integral 1200L belly diesel fuel tank is provided within the packaged unit, and based on review of manufacturer data, is capable of supplying backup power to the site for approximately 30 hours at full load (187kVA). This backup figure is theoretically compliant with the latest ESG requirements (24 hours required).

It is re-highlighted that modifications to the existing main switchboard have been configured such that the entire existing site electrical demand is connected to the generator supply system. In the context of the existing site demand, referring specifically to the retail meter data, and utilising the maximum demand figure of 212.1A recorded in February 2024, the current generator capacity is reaching its 250A limit (84.8% loaded).

6.3.2 SPARE UNCONNECTED GENERATOR UNIT

In addition to the currently connected and operational main 187kVA generator unit providing backup power to the site, another 330kVA Powerlink packaged unit (Model WPS300S-AU) is currently located adjacent the existing unit. This unit is observed in new condition, and according to nameplate data, was manufactured in 2021.

Based on site investigation and verbal advice during site investigation, the unit is currently not operational and has been assigned to the site for a potential increase in future generation capacity should the need arise. The commissioning and operation of the 330kVA generator would provide an increase of approximately 180% of the existing site generator capacity.

The existing site does not currently have the required electrical infrastructure to support the commissioning and operation of this generator, the use of which will also require upgrades to that infrastructure including a new site main switchboard.

It is proposed that a new generator switch board installed to facilitate the use of the spare generator unit.

6.4 EXISTING DISTRIBUTION BOARDS

As part of the JHA detailed design, a review of the existing distribution boards serving the new CT Imaging and Cancer Care Unit fitout areas was conducted to ascertain feasibility of re-use to supply the new area.

CT Imaging

The following provides a summary of that investigation:

- The existing area is supplied from distribution DB-5A and DB-5 (pictured below).

Figure 8 DB-5 & DB-5A Distribution Boards

- DB-5A and DB-5 are both supplied from the MSB Essential busbar – CB5 with DB-5A supplied line side of DB-5A.
- Review of the existing DB-5 capacity and does not have spare circuit/pole capacity however DB-5A does have spare capacity to support the new circuiting requirements for the CT imaging room fitout.

DB-5 & DB-5A Capacity		
	Pole Count	Capacity
DB-5	29	48
DB-5A	0	48

It is proposed that this DB-5A will be re-used for the CT Imaging fitout..

Cancer care unit

The following provides a summary of that investigation:

- The existing area is supplied with Cancer Service Centre Distribution Board(pictured below).
  -
- This distribution board has a split chassis configuration with non-essential and essential section, which are both supplied from the existing MSB.
  - Non-Essential Section – Supplied from MSB Non-Essential Busbar CB16
  - Essential Section - Supplied from MSB Essential Busbar CB2
- Review of the existing Cancer Services Distribution board revealed the board that does have capacity (pole/space) to support the refurbishment works within the Cancer Care Unit

Cancer Service Centre Distribution Board Capacity		
	Pole Count	Capacity
Non-Essential	40	48
Essential	5	12

It is proposed that this bord will be re-used for the Cancer Care Unit fitout..

6.5 EXISTING TELECOMMUNICATIONS INFRASTRUCTURE

6.5.1 CAMPUS DISTRIBUTOR/BUILDING DISTRIBUTOR

Currently the Main building of MUH supplied by a single existing campus distributor(CD)/building distributor(BD) is located on ground floor of the northern part of the building. From the as builts provided to JHA and onsite investigation the CD contains the MDF which is the sole telco lead in for this site.

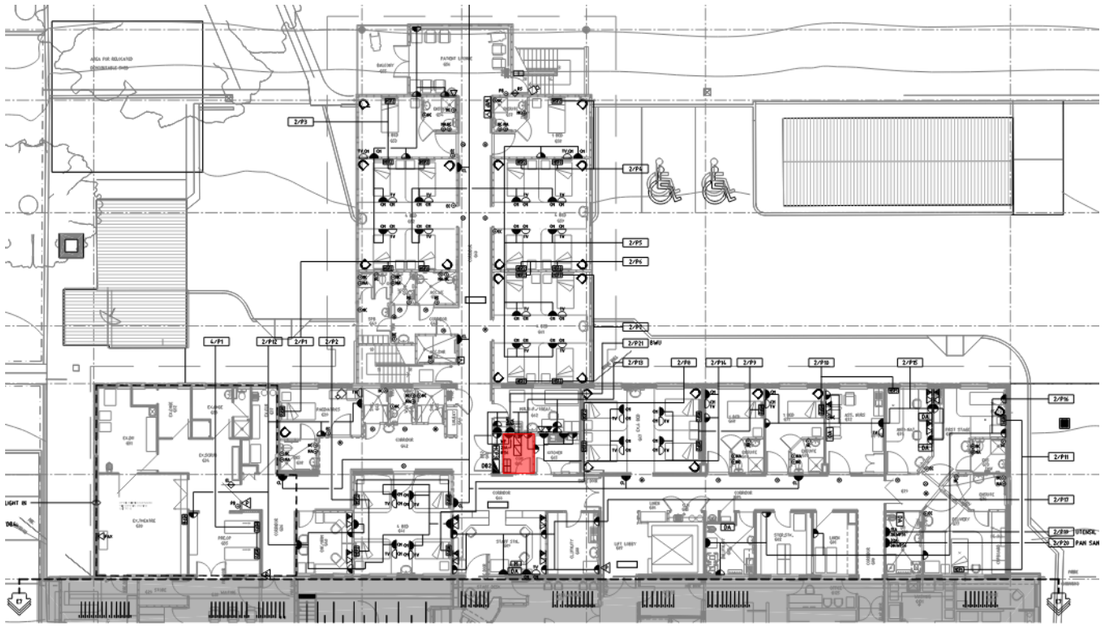

Figure 9 Indicative Location of Campus Distribution Room

The CD/BD is approximately 4sqm in floor area and contains 3-off Racks, UPS, Batteries, Nurse Call Headend and other services. It is noted that the current configuration of this CD/BD is reaching its capacity with limited wall and rack space for future expansion.

CT Imaging

Although this room is reaching its capacity it is proposed to be that this CD/BD will be retained and re-used for the CT Imaging Fitout. Based off preliminary data counts JHA have co-ordinated and confirmed with the ISLHD ICT team that there will be capacity to support this fitout. However, this will need to be re-confirmed during design finalisation when data counts have been finalised.

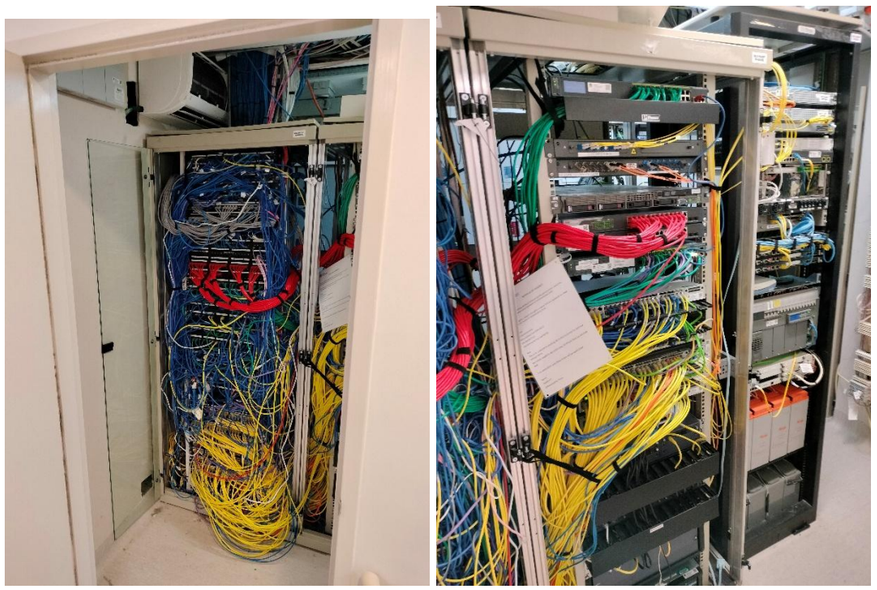

Figure 10 Existing CD/BD located on Level 1 of the Main Hospital Building

6.5.2 CANCER CARE UNIT - FLOOR DISTRIBUTOR ROOM

Cancer Care

The Cancer Cancer care BD/FD is contained within a FDR/Storage Room which is approximately 5 sqm and contains single 24RU Floor mounted rack, an electrical distribution board, nurse call cards and security door controllers.

As part of these works it is proposed that existing communications room will be utilised for communications for ICT/ICN services and reticulation, and as such, no new dedicated ISLHD/ICT backbone reticulation is required. This does not however include any backbone reticulation for non ISLHD ICT/ICN networks, such as third part networks for nurse call, patient monitoring, security systems and like.

7. ELECTRICAL SERVICES

7.1 KIOSK SUBSTATION

It is currently proposed to retain and re-use the existing pad mount substations and associated HV supply infrastructure for this scope of works. It is anticipated that the existing substations have sufficient capacity to support the electrical loads of both the existing to retain, and the proposed MUH building and associated works.

7.2 MAIN SWITCHBOARD/ MAIN DISTRIBUTION BOARDS

CT Imaging

A new dedicated external main switchboard and main distribution board will be provided for the site. Theses boards will be located within the existing main switch room located on Ground Floor of the main hospital building. Refer proposed site plan for details.

The new switchboards (Main Switchboard and Main Distribution Board) will have a Fire Safety Section (FSS), a 'Hospital Essential Services' section (HES - for devices that the hospital considers essential, but the NCC does not) and a non-essential section (NES) split between the two boards with all sections will be equipped with a minimum 30% spare space. The FSS and HES be generator backed and will be stepped onto the generator.

Consistent with ESG the proposed configuration provides the minimum configuration of busbars:

- Non-Essential Bus Bar (New MSB)
- Essential Bus Bar No.1 (New ESS-MDB)
- Essential Bus Bar No.2 (Existing MSB)
- Life Safety Busbar (New ESS-MDB)

It is expected that the existing MSB will be decommission in future, and when this occurs an additional essential main distribution will be required to ensure compliance with the ESG.

Switchboards supplying emergency, critical and UPS loads will be provided with switchgear that will be monitored by the future BMS. This will include status contacts on circuit breakers supplying:

- Emergency Loads – safety services as defined by AS3000
- Critical Loads – supplies to critical care areas
- UPS Loads – UPS switchboards

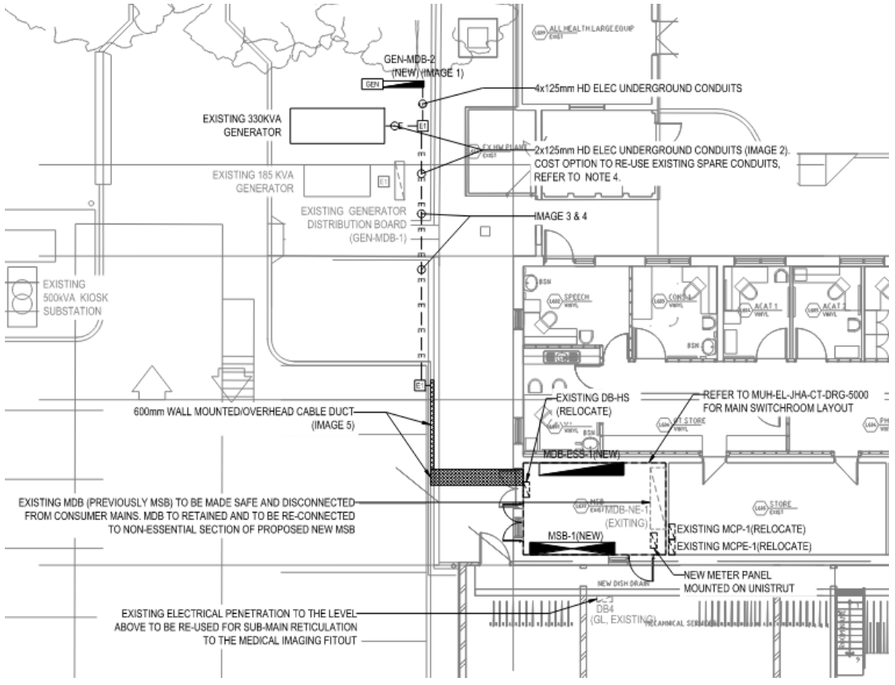

Figure 11 Proposed Site Layout

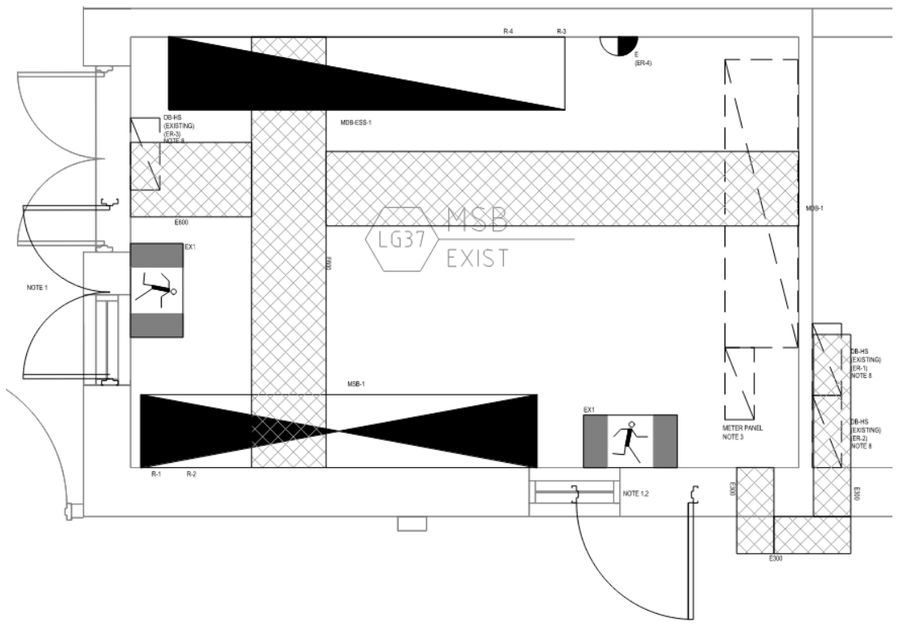

Figure 12 Proposed Main Switchroom Layout

7.2.1 MAIN SWITCHBOARD (MSB)

CT Imaging

The main switchboard will be Form 3B, Min. IP42

The new site main switchboard will have a have a single non-essential busbar and will be equipped with a minimum 30% spare space. Due to the spatial constraints of the existing room that a single MSB with multiple bus bars for essential and fire life safety as per the ESG was not feasible.

During Design Development it has been calculated that the existing consumer mains cannot supply the full load current of the substation. Due to this the SPD at the new MSB will be wound down to 630A and in future upgrades when the consumers main are replaced can be wound back to 800A to support the full load of the substation.

Power metering shall be supplied in accordance with section J7 of the NCC. A private meter will be provided with a high-level interface for the future BMS to allow for monitoring and recording of:

- kWh,
- kVA,
- current,
- voltage,
- power factor
- THD

An authority grade LV CT metering shall be provided so that the main can have its own electricity account and NMI and retail electricity account.

7.2.1 MAIN DISTRIBUTION BOARDS (MDB)

CT Imaging

The main distribution board will be Form 3B, Min. IP54

The new essential main switchboard will have a have a Fire Life Safety Section and an Essential Section and will be equipped with a minimum 30% spare space.

The new board will have the essential is described below at a high level:

- To supply CT, MRI, mechanical services and essential light and power switchboards in the Medical Imaging fitout area.
- Local ATSs within switchboard.
- 500A generator supply from existing block the new Generator Switchboard Located externally
- 500A non-essential supply from existing Block B Level 03 Main Distribution board.

The new switchboard shall have a fault level to suit the supply substation and the generator fault current. Specific mention is made to the due to the closed transition generator configuration.

As stated above the it is proposed that the existing distribution boards will be re-supplied from this board after the decommissioning of the existing MSB in the future. It is also expected that a new Essential MDB will be installed to replace the MSB to maintain compliance with the ESG.

7.3 DISTRIBUTION BOARDS

As stated above it proposed that all fitout works will be supplied from the existing local distribution within their respective areas.

Based on the existing electrical infrastructure of the MUH as a community health center only a single essential distribution has been used for the each fitout.. It is expected that future upgrades will provide the Essential, Non-essential UPS submain/Distribution Boards for a complaint ESG electrical infrastructure which the infrastructure upgrades associated with the CT imaging fitout works will facilitate.

For this reason, there are no proposed non-essential and UPS distribution boards/submains to theses the fitout areas. Confirmation on the project not requiring non-essential and UPS distribution boards has been confirmed with the wider project stakeholder group.

7.4 SUPPLY AUTHORITY APPLICATIONS AND REQUIREMENTS

The contractor is required to make formal applications to the supply authority for a change in supply (increase in demand) and expected substation shutdown, with the calculated maximum demand and the method of supply finalised during design finalisation. The contractor is required to make all applications, submissions and pay all fees associated fees, and allow for all correspondence and liaison with the supply authority. For estimated detailed design maximum demand, refer estimated in below section.

The contractor is required to liaise with the supply authority at the very earliest stage following award of the contract to minimise any risks to the project programme.

The contractor shall allow for all required supply authority designs and required works to complete the electrical supply scope of works. It is expected ASP Level 2 will be required in this fitout works. Notify the project manager of any Supply Authority required works and correspondence.

7.5 GENERATOR

7.5.1 GENERATOR SWITCHBOARD

The existing unconnected diesel generator is proposed to serve the site the new ESS- MDB in conjunction with the existing connected 185kVA diesel generator supplying the existing MSB.

A dedicated Generator Main Distribution Board (Gen MDB) will be provided adjacent to the unconnected diesel generator and distribute the power supply to the MDB via separate sub-main cabling to each ATS within the Life Safety and Essential busbars.

The method of testing the standby generator system shall be by synchronisation and automatic paralleling with the mains supply, using the Hospital installation as the test load and without using dummy load banks. Note that this testing mode will not impact the power supply to the building and will not disrupt a fully functional building.

As per NSW Health ESG requirements, a Generator Link Box (GLB) will be provided to connect a portable diesel generator in case the on-site diesel generator fails during a power outage see section 7.5.2 for further details.

It is intended that most of the existing electrical infrastructure will be supplied from the existing MSB, as most of the existing electrical infrastructure will be retained. When the existing MSB is decommissioned, it is expected that all existing electrical infrastructure will be supplied from the new MSB and ESS-MDB and the 330kVA generator will provide back-up to the site. As stated before to ensure compliance with the ESG the decommissioned MSB will be required to be replace with a new essential MSB to maintain compliance with the ESG.

7.5.2 TEMPORARY GENERATOR CONNECTION POINT

This temporary mobile diesel generator connection is provided in the event of a total power failure by the normal supply from Endeavour Energy and a failure of the fixed standby diesel generators. Provision will be made for the temporary connection of mobile diesel generating sets to connect into the new main switchboard. This connection panel will be located externally in a location accessible for a temporary generator to be dropped off.

The temporary generator connection point shall have sufficient space to land a containerised genset of the same size as the permanent genset, inclusive of all controls required to enable synchronisation of the temp genset with a remaining healthy permanent generator.

The temporary connection point shall also be configured so that a load bank testing facility could be connected instead so that the generators may be tested should insufficient load be produced by the hospital for live load testing. It should be stressed that the strong preference is to test the generators on live load, as per ESG recommendations, so that the entire transfer system is tested periodically. The temporary load bank should be considered a backup option only for testing purposes.

At present the temporary generator connection point located adjacent to the Generator Switchboard.

7.6 LOW VOLTAGE INFRASTRUCTURE WORKS

7.6.1 UNINTERUPTABLE POWER SUPPLY (UPS)

CT Imaging

UPS's are required to be provided consistent with ESG will supply critical loads associated critical clinical equipment within the CT Imaging Fitout area. It is currently proposed to provide:

- A single 5kVA floor mounted system with batteries to be mounted under the desk of the CT .
- The UPS systems are required to support their output rating supply for a period of 20 minutes. Batteries are required to be sized to support the 20 minute run time at End of Life (EOL) of the batteries.

All UPS's will be configured for modular N+1 capability.

The following specific points are to be noted:

1. All UPS' shall be modular
2. Consistent with the ESG the Communications UPS' will be provided with battery autonomy of no less than 20 minutes at full load.
3. All quoted battery autonomy is "end of life" (EOL).
4. UPS batteries will be in multiple battery strings to ensure single failure or planned maintenance does not impact on reliability.
5. The UPS' will incorporate an external maintenance bypass switch.
6. The UPS will be monitored by SNMP card and dedicated alarms.
7. The design shall take particular note of the ESG's narrative regarding "UPS Resilience" and design the infrastructure appropriately to suit.
8. All quoted KVA is assuming unity power factor (i.e 1kVA = 1kW). Allow to update the system size to meet the power factor of connected loads.

7.6.2 MAXIMUM DEMAND (MD) SUMMARY

As the electrical load is not anticipated to increase substantially under the proposed refurbishment.

As a strict requirement of the design finalisation, detailed maximum demand calculations are required to be undertaken for the fitout areas, and submitted for engineer review.

CT Imaging

It is expected that there will be minimal changes to the maximum demand for lighting and power for CT Imaging. MME will be supplied directly from the new MDB-ESS-1 see below for further details.

Cancer Care

Cancer Carer Services DB Maximum Demand	
Existing Maximum Demand	35A
Expected Maximum Demand	39A
MD Increase	**4A**

Overall Site Maximum Demand	
Existing MD (based off an application from Endeavour, refer to Appendix F for further details)	212A
X Ray MD (Based off MME schedule provided by the ISLHD)	50A
CT Imaging MD (Based off MME schedule provided by the ISLHD)	99A
Expected increase to MD: Cancer Care Services BD	4A
Expected increase to MD: DB-5A & DB-5B	0A
Total	**365A**

7.6.3 EXISTING ELECTRICAL FIXTURES AND ASSOCIATED CABLING

The new fit-outs will comprise completely new fixtures and outlets, and entail a completely new cabling of electrical, structured cabling and security services, unless stated otherwise.

It is however a requirement for the contractor to strictly survey and investigate all existing electrical services within the fitout and adjacent areas and ensure those services are either made redundant and removed or retained during and post construction works.

8. ELECTRICAL INFRASTRUCTURE METHODOLOGY

8.1 TYPICAL ELECTRICAL DISTRIBUTION BOARDS

All circuits will be provided with combination over-current and residual current breakers (RCBOs) at the local distribution board with the exception of circuits to body protected areas (requiring remote RCD resetting) and those circuits exempted by AS/NZS 3003 & AS/NZS 3000.

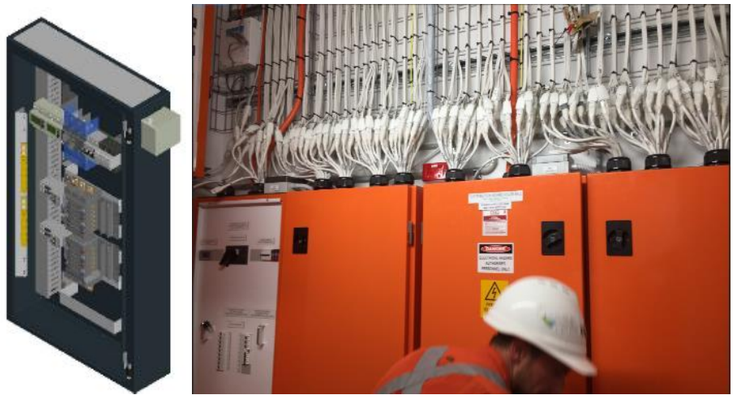

Figure 31 – Typical Distribution Board Cupboard

8.2 METERING

Private check metering shall be provided at the new DB on the following basis:

- NCC / BCA
- ESG

All Low Voltage metering shall be by way of private multi-function meters. Metering shall be provided with RS485 or similar outlet for connection to a future site wide EMS system. It is understood that no EMS system is present on site for general lighting and power and is not proposed to be included in this scope of works.

It is however a requirement of this project that these meters are installed as required in this electrical documentation, for future connection in other works. Coordinate the metering, communications protocol and future EMS requirements with the ISLHD.

8.3 EARTHING

Earthing will be provided throughout all areas of the new works on the following basis:

- AS/NZS 3000 Wiring Rules
- Endeavour Energy Network Standards
- NSW Services and Installation Rules
- Health Infrastructure's ICT Cabling Standards
- AS/NZS 3003 Electrical Installations – Patient Areas

Additionally, a dual-purpose communications earthing system (earth bars and dedicated cabling) will be provided in the new communication room for the connection of all racks and equipment within to comply with the recommendations of S009.

8.4 CONSUMER MAINS / SUBMAINS

Fire rated cabling will be installed to all Fire Safety Services sub-mains and the consumer mains.

2hr fire rated submains will be provided to all fire safety services (as nominated by other disciplines).

Submains will be reticulated on cable tray and positioned such as to avoid habitable areas and thus minimise exposure to EMI.

It is also a requirement of the ESG select critical submains (generator & UPS) are required to have their status monitored by the site BMS.

Note: Provision for the connection of a portable standby generator is required and documented, and is outlined further above and in the electrical documentation.

8.5 SURGE PROTECTION

Surge protection on the telecommunications system and new distribution boards to be provided throughout in accordance relevant Australian Standards

The surge diverters shall be equipped with visual indication and voltage free contacts for BMS interface.

8.6 WIRING SYSTEMS FOR PATIENT TREATMENT

At this stage, a number of rooms are deemed body protected patient areas, and must meet the requirements for such areas. No cardiac protected rooms are currently planned for the MUH Fitoutsareas.

Generally, all Patient occupied areas where treatment will be undertaken will be to AS3003.

Standard colour-coded outlets will be used (as per AS3003). Shuttered outlets will be provided in the areas where young children and patients at risk are likely to frequent.

Power outlets servicing patient care areas including all inpatient beds, en-suites, consulting rooms and the like will be body protected in accordance with the relevant Australian Standards and as dictated by the Architectural room data sheets. Sub circuiting will be configured so that no more than 8 single GPOs (or 4 double GPOs) are on any one power subcircuit.

Separate dedicated cleaners socket outlets will be provided along corridors and within treatment areas in accordance with AS3003.

UPS status indicators will be provided wherever UPS-supplied sockets are provided within Cardiac and body protected areas.

8.7 LIGHTING GENERAL PRINCIPLES

Interior lighting shall be in accordance with the general requirements outlined within the ESG, AS 1680, the associated Design drawings, specification and the contents of this report.

All luminaires throughout shall implement LED technology to facilitate an energy efficient design outcome and to ensure reduced maintenance. Luminaires will be selected such that their lumen output is a minimum of 50,000 operating hours at L70.

The final selection of luminaires will be required to comply with the following minimum:

- Manufacturer must have a proven history within the Australian market of 10 years minimum.
- Be compliant with all relevant Australian Codes and Standards.
- Be of robust construction and be suitable for purpose.

All lighting shall have a colour temperature of 4000K.

Motion controlled lighting is required to be implemented where in nominated locations, for NCC Section J8 compliance and/or where a demonstrable benefit exists (i.e. typically the control of 4 lights or more in appropriate rooms). Typically, such motion-controlled lighting will be limited to WCs, storage rooms, workstation areas and low occupying areas of the like.

Colour rendering throughout shall be no less than Ra 80 as per AS1680.2.5. Dedicated medical examination and procedure lights will be Cyanosis compliant as well as sealed recessed LED luminaires.

The following illumination levels will be adhered to in accordance with AS 1680 or minimal levels dictated the NSW guidelines or the NCC.

CT Imaging

TYPICAL AREAS	LIGHTING LEVEL (LUX)	STANDARD
PATIENT CARE AREAS		
Control Room	320 @ 700mm AFFL	AS/NZS 1680.2.2
X-ray & CT Room	400	AS/NZS 1680.2.5
PATIENT BAYS/BEDROOMS		
Patient ensuites/WCs	160	AS/NZS 1680.2.5
BOH SUPPORT AREAS		
Stores	80	AS/NZS 1680.2.1

Cancer Care Unit

TYPICAL AREAS	LIGHTING LEVEL (LUX)	STANDARD
CIRCULATION		
General circulation	80	AS/NZS 1680.2.1
Waiting Rooms	160	AS/NZS 1680.2.1
PATIENT AREAS (SUPPORT)		
Reception	320 @ 700mm AFFL	AS/NZS 1680.2.2
Consult room	320 @ 700mm AFFL	AS/NZS 1680.2.5
PATIENT BAYS/BEDROOMS		
General lighting	160 @ 1000mm AFFL	AS/NZS 1680.2.5
Examination lighting	320 @ 1000mm AFFL	AS/NZS 1680.2.5
Patient ensuites/WCs	160	AS/NZS 1680.2.5

8.7.1 IMAGING ROOMS

CT Imaging

Imagining Rooms General Principles

- LED recessed high output dimmable downlight, IP44,
- Quantity of fittings selected to provide increased lux levels above those stipulated in the ESG
- Dali dimmable, IP44 rated, 85 CRI and long life cycle.
- Switching and dimming automated via room lighting control panel.

8.7.2 TOILETS (PATIENT)

CT Imaging

Toilets General Principles

- LED recessed downlight,
- Manual switching to be provided
- Dimming and motion detection are not proposed

8.7.3 CONSULT ROOMS

Cancer Care

- LED recessed troffer 600mm x 600mm,
- High colour rendering CRI 85, IP44 sealed luminaire, smooth inverted diffuser
- Dedicated medical procedure light ceiling mounted
- Conventional Control of lighting via wall switches and motion sensors

8.7.4 IPU BED AREAS

Cancer Care

Patient Wards 1 Bedroom and 2 Bedroom General Principles

- Ceiling mounted pendant examination light,
- General purpose ceiling recessed 600mm x 600mm IP44 from below and 85 CRI,
- Patient ensuite with ceiling mounted downlights IP44 from below,
- Conventional control of lighting via wall switches
- Motion sensing to control lighting in the ensuite will not be included. A conventional wall mounted switch located outside the ensuite will be adopted. Note, this is a departure from the SD but is consistent with precedence on other NSW Health sites.

8.7.5 RECEPTION

Cancer Care

Staff Station General Principles

- Recessed LED downlights
- Surface mounted joinery task lights beneath countertop
- Conventional control via wall switches for task lighting and the area sound the staff station will be controlled by the lighting control system.

8.8 LIGHTING CONTROL

In line with existing campus lighting control methodology all lighting control to be implement will be conventional mains switching. Where dimming is required for rooms a luminaire that is 1-10V capable will be installed.

The following table represents the proposed lighting control within typical areas for the building. This lighting control will include items such as motion detection and timers as required.

CT Imaging

REFERENCE	LIGHTING CONTROL TYPE	TYPICAL AREAS
1	LOCAL SWITCHING	Toilets
2	OCCUPANCY SENSORS	Store rooms Toilets
3	LOCAL SWITCHING / 1-10V DIMMING	Control Room X-ray and CT Room

Cancer Care Unit

REFERENCE	LIGHTING CONTROL TYPE	TYPICAL AREAS
1	LOCAL SWITCHING / OCCUPANCY SENSORS	Ensuite Patient Bedrooms
2	PRESENCE/ABSENCE DETECTION (MANUAL OVERRIDE)	Consult Rooms Reception

8.9 EXIT AND EMERGENCY LIGHTING

Exit and Emergency lighting shall be provided throughout all areas in accordance with the latest following guidelines and standards:

- ESG
- AS/NZS 2293
- NCC / BCA

Emergency and exit lighting throughout the refurbished areas will be LED type and be a hard wired system and connect to the existing emergency lighting test facility at each existing distribution boards.

Emergency and exit lighting shall be located to comply with the NCC and AS/NZS 2293.1.

9. ICT SYSTEMS

9.1 ICT INFRASTRUCTURE SERVICES WORKS

9.1.1 GENERAL

The existing local floor distributors are proposed to cover the proposed refurbishment and existing spaces:

- JHA have met with ISLHD ICT, and have received endorsement to utilise this existing communications room (FDR) to services the fitout areas. However, as part of design finalisation, the contractor is required to communication with and liaise with the ISLHD to confirm this approach, as well as coordinate all works, patching locations, termination requirements and the like, and coordinate any access and required shut-down associated with the scope of works.
- These room are currently operational and service the existing adjacent areas to the fitout areas.
- CT Imaging
    - Areas serviced by this existing CD/BD are considered critical, and within the existing ED footprint.
    - Location grade' Wifi coverage to all new fitout and perimeter locations is required
- Co-ordination is required with the ISHLD for the shutdown of communication services prior to works.
- All new structured cabling is to be installed to the new racks within the room, with legacy structured cabling to areas outside of the project scope to be protected and retained.
- There are a series of security, nurse call and other wall mounted devices on walls which are to be retained and maintained during the expansion. The contractor shall allow for a detailed survey of this equipment and for relocation of non-redundant panels and diversion of cabling.
- Under this contract, the contractor shall provide a detailed WIFI predictive survey as a group 1 item. The contractor is required to liaise with the ISLHD ICT team and utilise their preferred/nominated heat mapping vendor. Allow to liaise with the ISLHD ICT team for all required inputs including performance requirements and required system specifications, such as mobile duress, RTLS and patient monitoring requirements.
- In order to facilitate the expansion of these rooms, the contractor shall allow for the preparation of a detailed staging and construction plan, to adequately protect operational equipment within this space. This will entail but not be limited to temporary construction barriers to protect equipment for excess dust and considerations to major vibration disturbances during demolition.
- The current positioning of the existing Floor Distributors throughout the building is such that it is highly expected the cable lengths will not exceed the required maximum of 90 meters. Allow to re-confirm during design finalisation.

9.2 PROCUREMENT & INSTALLATION GROUPS

A key element of the telecommunications / ICT scope is a detailed knowledge of the roles and responsibilities when it comes to the procurement and installation of key ICT services. It is not uncommon for large projects of this nature and complexity to develop detailed delineation schedules that categorise project elements into either Group 1 (Builder Supplied & Installed), Group 2 (ISLHD Supplied and Builder Installed) or Group 3 (ISLHD Supplied & Installed). Given the project ICT planning is still evolving, and the strategic ICT brief is yet to be released, planning such a delineation schedule may not have been developed yet. In the absence of such a firm site-specific document, the project will be progressed by following the Health Infrastructure standard delineation as identified in the graphic below.

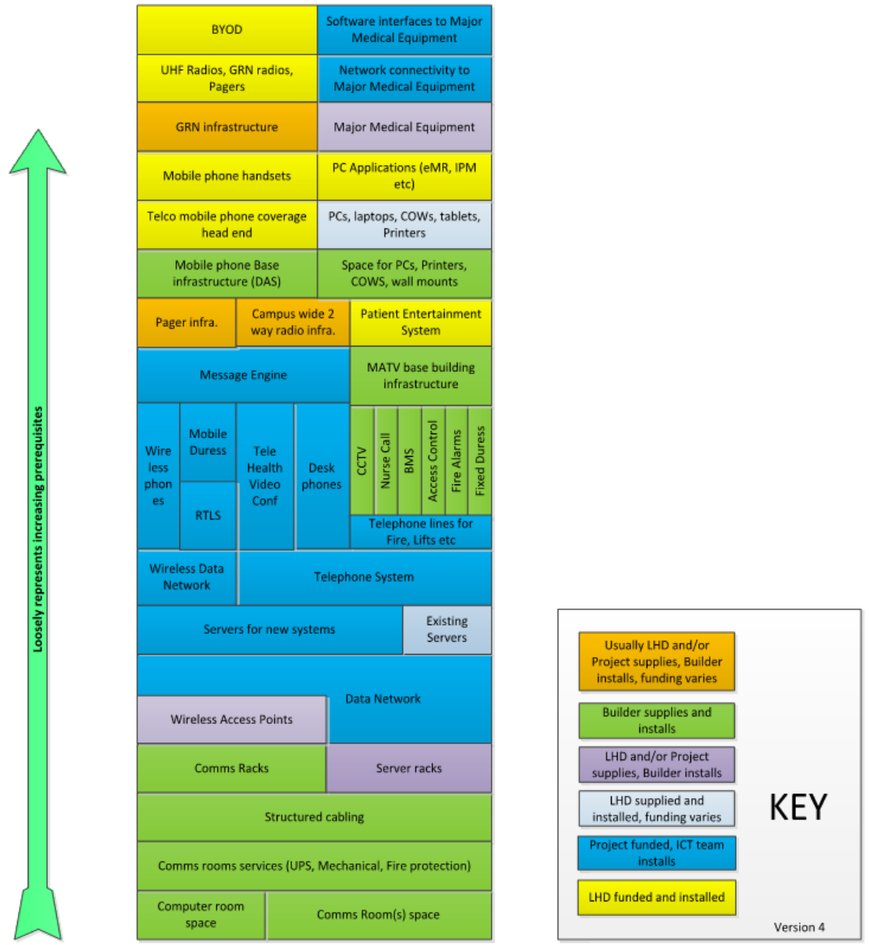

Figure 34 A conceptual view of infrastructure related ICT in a health facility development – Source: NSW Health Engineering Services Guidelines, Aug 2016

9.3 GENERAL

The existing local FDRs will be utilised expanded where required to provide communications, ICT, security and nurse call services to the proposed fitout areas.

9.4 PENETRATIONS WITHIN COMMUNICATION ROOMS

Any required penetrations within communications rooms shall be coordinated with the room layout and provided in an appropriate corner of the room to avoid trip hazards.

There shall be no permanent hob(s) installed around penetrations. Should hobs be required or desired during construction, these shall be temporary and completely removed prior to handover.

9.5 RETICULATION PATHWAYS

Fibre and copper will be reticulated on cable support systems including ladder tray or cable basket throughout the installation. Cable supports will be sized for the required cables plus spare capacity. Note, reticulation paths must follow circulation areas. Cable paths over clinical spaces will not be permitted.

9.6 HORIZONTAL STRUCTURED CABLING

Horizontal structured cabling solution shall be Cat 6a Class Ea F/UTP cable. All componentry of the structured cabling solution shall be Cat 6a. Refer electrical specification for cable details.

A 20-year warranty will be provided for the structured cabling system. All components of the structured cabling system, including but not limited to racks, patch panels, cabling, connectors, outlets etc. shall be a single vendor solution. At the direction of the ISLHD, the nominated single vendor for the site shall be Panduit. Horizontal cabling system installers shall be Panduit certified.

The quantity and location of all Cat 6a outlets shall be as nominated by the Architectural room data sheets / dRofus. In addition to the outlets nominated a Wireless Access Point (WAP) network will be established throughout the new build. The final positioning of such WAPs will be determined during the design finalisation phase after a comprehensive heat mapping exercise has been undertaken. The WAPs are a group 2 item.

Note that the driving force behind the positioning and density of the WAPs will be strict compliance with the NSW Health Protecting People & Property for mobile duress alarm and RTLS systems.

- WAPs are a Group 2 item. Cabling and outlets for WAP point are Group 1.
- Heat mapping survey is to be undertaken by the contractor as part of this project scope (group 1).
- Each WAP location shall be provided with a single Cat 6a outlet.
- Make allowance for the supply and installation of all fly leads and patch leads to match 100% of the installed Cat 6a outlets.

9.7 RETICULATION PATHWAYS

Copper will be reticulated on cable support systems including ladder tray or cable basket throughout the installation. Cable supports will be sized for the required cables plus spare capacity. Note, reticulation paths must follow circulation areas. Cable paths over clinical spaces will not be permitted.

9.8 ACTIVE IT EQUIPMENT

The supply, installation and configuration of all ICT active equipment will be a Group 3 item. Allow for all required coordination with LHD ICT during design finalisation.

9.9 TELEPHONY

The telephony system (VoIP) is a Group 3 item. The client will organise for the supply and installation of this system (inclusive of rack mounted head end equipment, desk mounted handsets and WiFi handsets etc) as a Group 3 item. All structured cabling to support the telephony system will be a Group 1 element.

9.10 WIRELESS HANDSETS

Any required wireless handsets will be provided by the client as Group 3 items. Integration with building systems to these handsets will be by the client as a Group 3 item, with the Contractor rendering all assistance as required.

Desk-top chargers will be as Group 3 items.

9.11 INTERCOMS

Cancer Care Unit

Intercoms provided in this project are to be provided by the contractor as Group 1.

Intercoms throughout the department will be of the colour audio video type were nominated on the Security Principles Schedule. The Intercoms will allow communications between staff in secure areas or areas that may be secured after hours and persons wishing to gain access to those areas. Once the bona fides of the person wishing to gain access has been established staff will be able to provide access via a door release button on the Intercom Master Station.

The proposed new intercom system will be an IP based system (Airphone IX Series Integrated IP Communications System, as per the existing system utilised onsite or approved equivalent) and be cabled using Cat 6a back to PoE network switches. Intercoms shall be capable of saving / storing images for security review.

The system will comprise or the following components: -

- GUI PC touch screen in the security control room
- Master intercoms with touch screen
- Slave intercoms
- Non-contact slave intercom
- Redundant controllers

Figure 13 – Typical Intercoms

9.11.1 MASTER STATIONS

Cancer Care Unit

Designated Master Stations with touch screen will be provided at the Reception.

9.11.2 SLAVE INTERCOMS

Cancer Care Unit

The system will include vandal-resistant video intercom stations for visitors and after-hours access at nominated locations.

10. NURSE CALL SERVICES

10.1 GENERAL

It has been noted on site that an Austco based System has been installed and interfaces with multiple other nurse call systems.

The existing Austco Nurse Call System within the the floor distributor rooms shall be expanded upon for the Fitout areas.

Provide all necessary upgrades to the existing backbone cabling, and provide new nurse call card controllers to the system head end to facilitate the fitout scope of works.

Provide all required necessary upgrades to the backbone cabling and connection from the new system to the existing site head end.

10.2 NURSE CALL SYSTEMS

Provided an IP-addressable nurse call system conforming to AS 3811 and the ESG will be provided throughout the refurbishment zone.

The nurse call system will be self-contained with the capability of extension or integration with other systems such as the following to provide an integrated communications system throughout the new works:

- Integration with Wi-Fi telephone handsets
- Other existing nurse call systems
- Cancer Care
    - General Room Lighting

The system will have distributed intelligence to minimise disruptions to the Hospital. The nurse call system will be a software-orientated, logically-connected system operating over Cat 6a F/UTP cable.

The nurse call system will include a master nurse station PC, bed-end patient call points, waterproof bathroom/en-suite patient call points, staff-assist call points, emergency call points, corridor indicator lights, staff alert alarms, annunciator panels, floor distribution units and fault monitors to ensure a safe and reliable system.

10.3 NURSE CALL HANDSETS

All handsets are made in Australia and were especially designed with a large braille embossed nurse call button with ‘cord-out’ alarm.

The nurse call entertainment handset will provide the following functionality:

- Nurse call pushbutton and reassurance light
- TV on/off control
- TV volume control
- TV / Radio channel change control
- Speaker for TV / Radio sound
- Bed head reading light
- The handset will be of the approved type acceptable to the infection control team.

10.4 CORRIDOR LIGHTS

The nurse call corridor lights will offer the following functionality

- Provides all intelligence for the room
- All Nurse Call Stations home run to the controller
- Speech or Non Speech available
- 2-Lamp, 4-Lamp, Lampless
- 6 point, 16 point
- Colours are configurable to hospital requirements

11. SECURITY SERVICES

11.1 PROPOSED SECURITY PHILOSOPHY

The security shall follow the below design philosophy requirements.

- The fitout areas will be equipped with an IP-based security solution, inclusive of electronic access control, CCTV surveillance, Intruder Detection System and Fixed Duress Alarm. The system will have the provision to be locally monitored from the main security control room as well as remotely monitored by a specialist security firm.
- The existing Campus is currently served by a combination of Inner Range Integriti, and legacy Concept 4000 equipment. New security services for the fitout will expand on the Inner Range Integriti system.
- Interfacing the security networks shall occur over the ICT links via an integrated communications network system through VLAN.
- The new systems shall be consistent with those currently in use within the campus and thus, allow for the ease of integration to form seamless systems across the campus. The systems shall reside on the hospital's ICT network to facilitate such integration and remote monitoring.
- The security systems will integrate with various other building engineering systems on site inclusive of the fire system.
- The system will consist of card readers, electric strikes, electromagnetic door locks, reed switches, etc. These will interface with the existing server located in the Campus Distributor / Server room.
- Integration of new cameras into the existing IP-based Video Surveillance System (VSS), utilising IP-based Avigilon cameras.
- An IP-based Audio-Visual intercom system (colour) equal to the Aiphone System. The system will consist of internal and external intercoms with the server residing within the Campus Distributor / Server Room.
- As per the ESG extended UPS autonomy is required for the security systems. As such, the security system will be fed from the associated ICT UPS system.

11.2 ELECTRONIC ACCESS CONTROL SYSTEM

The existing campus is currently served by a combination of Inner Range Integriti and legacy Concept 4000 equipment with an Inner Range Integritti headend located in the CD/BD. New security services for the fitout will expand on the Inner Range Integriti system.

The Inner Range Integriti system is an IP-based, modular in its nature and as such is readily expandable to fitout areas. This will ensure a level of consistency between existing campus and the imaging fitout.

The electronic access control system will also accommodate all new intruder detection and alarm system, and fixed duress system.

It is proposed the EACS will accommodate the following consistent with the Security Principles as identified within the associated appendix and room data sheets.

- Locally mounted card readers at nominated door locations to facilitate secure staff access and movement around the facility.
- The EACS will consist of new but not limited to main controller, door controllers, door I/O modules, door licences, power supplies, card readers, reed switches, electronic locks, request-to-exit buttons, keypads and emergency break glass units and etcetera; and
- Anti-pass-back functionality capabilities.
- Cancer Care
    - Remote door release and lock down functionality provided at the reception and to be integrated with existing system as per ISHLD requirements.

The EACS together with Video Surveillance System and the intercom system will facilitate controlled movement of staff, authorised persons and visitors throughout the facility.

The EACS will monitor the open/closed status of various doors and alarm status for attempted unauthorised entry, forced door, door ajar, door open too long and other system alarms; and report these for logging, alarm notification and further action.

The EACS architecture will be based on distributed intelligent controllers to maintain continuous operation of the connected doors regardless of the status of the SMS communications. The communications link will be monitored and will initiate an alarm on failure or loss of communications with the field equipment or controllers.

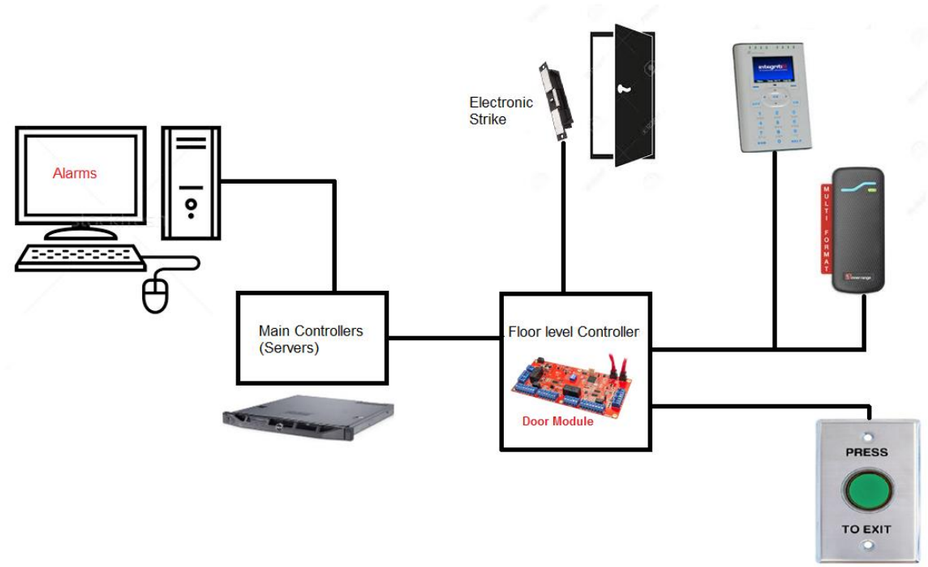

Figure 14 – Typical Security Control Schematic

11.3 ACCESS CARDS AND CARD READERS

The card readers and keypads will be of a vandal resistant construction and securely affixed to their mounts using tamper-resistant screws.

All card readers and keypads will be installed in accordance with DDA requirements.

11.4 ELECTRONIC LOCKING

Electronic locks will comprise a combination of commercial locks for single and double doors, including:

- Single Access Control Door – Padde ES9000 or equivalent Pre-Load Electric Strike, with free handle egress.
- Double Access Control Door – Padde Mechanical Double Electromagnetic or equivalent locks, with Request to Exit buttons and Emergency Break Glass Unit (where applicable. Highly sensitive and restricted areas may be provisioned with card reader in and card reader out configuration with a request-to-exit button) for release.

All access control and electrically locked doors will be monitored and report the following control and alarms status:

- Forced door alarm.
- DOTL alarm.
- Door status (open/closed).
- Request to exit operation.

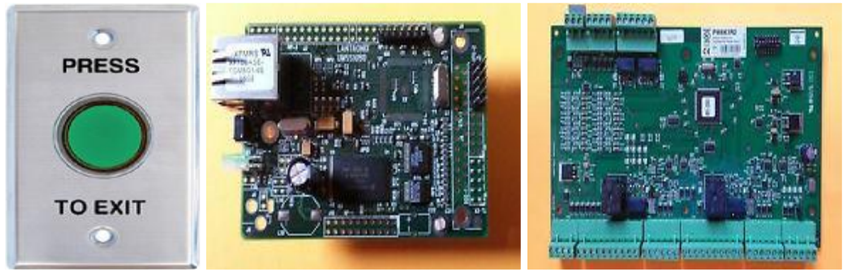

Figure 39 – Typical Electronic Locking Access Control

11.5 FIRE DOORS

All EACS doors designed as Fire Doors or within the path of will be configured to automatically release upon receipt of a Fire Alarm signal from the Fire System. Such doors will be configured in a "fail safe" manner so as to ensure emergency egress at all times.

Fire doors will be access controlled to prevent members of the public trespassing between floors. Emergency break glass unit (monitored back at the security control room) will be provided on each fire door to allow egress..

11.6INTRUDER DETECTION AND ALARM SYSTEM (IDAS)

The EACS will monitor and report the state of intrusion monitoring devices installed throughout nominated departments.

Intrusion alarms will be limited to reed switches installed on external access doors and plant room doors to provide an indication to security monitoring staff when such doors are opened or left open during times which are unexpected.

Intrusion detection monitoring will be provided as a minimum to the following:

- Perimeter doors

All intrusion detection devices will be installed with End-Of-Line (EOL) resistors located at the device to enable 4-state monitoring and provide tamper detection.

11.7DURESS ALARM SYSTEM

It is proposed that the fixed duress alarm system will be a part of the EACS. Fixed duress buttons will be provided to nominated areas as documented.

The Duress Alarm System will consist of an EACS Main Panel, Input and Output Expanders, Duress Buttons and Security Management Software.

11.8 CCTV SURVEILLANCE SYSTEM

The CCTV system will be used for both verification of alarm information and management of the normal activities that occur within the building.

Currently there are two existing CCTV systems onsite which run in parallel to one another, a system with analogue cameras with digital recordings (via DVR's) and an IP Based system. The analogue system currently services areas outside of the Medical Imaging fitout, this will be retained, and the existing IP Based System will be expanded for the refurbishment.

The CCTV system will comprise of the following components:

- Integration with the existing site IP based System.
- Multiple Network Video Recorders (NVRs) allow to augment to accommodate new cameras
- Power-over-Ethernet (PoE) CCTV colour cameras located throughout refurbished areas.
- Licensing for Avigilon
- New IP based Fixed Cameras as per drawings
- Horizontal Cabling to FDR

The extent of the VSS is illustrated on the Security Principles Schedule located in the associated appendix. Note, the VSS will be UPS & generator backed.

11.8.1 NETWORK VIDEO RECORDERS

Cancer Care

Existing system to be augmented to allow for the control and management the transmission, display recording and storage of the video in the fitout. Minimum of 30 days back-up to be retained.

11.8.2 RECORDING

Cancer Care

The existing system will be expanded to have the processing and storage capacity to record all cameras at a rate of 25 frames per second (fps), with a minimum resolution of 1080p, at all times, enabling a minimum of 30 days storage on hard disk drive. All footage will be recorded via the Network Video Recorders.

The following table details the recommended recording rates and parameters for optimal recording performance (i.e. in excess of the 30 days) as described above:

Camera Type	Continuous	Activity Detection	Alarm Condition
Building Entry Camera	HIGH, 12fps	-	HIGH, 25fps
Door Intercom Camera	-	LOW, 5fps	Medium, 12fps

For the purpose of this Report, recorded video quality is categorised as follows:

- HIGH – Maximum resolution available (i.e., 1080p)
- MEDIUM & LOW – Minimum half of 'HIGH' resolution (i.e., 720p)

All alarms will be recorded in real time, at a high quality, for the duration of the alarm condition. All associated alarm video will be tagged and available from within the Security system alarm list and audit trail as described previously.

All recorded video files will include a time (from NTP Server) and date stamp and camera title. This information is stored within the digitally recorded file and will be overlaid on the recorded video so as not to obscure the image view. Alarm event stamps will also be included within the recorded file and history to enable prompt and efficient retrieval of a designated alarm or event.

All recorded video images will also be available for export to common digital storage mediums, such as DVD-R, USB flash drive and the like. All images will be available for viewing on any Microsoft Windows compatible computer and be complete with a tamper-evident watermark/digital signature, to ensure video integrity.

11.8.3 CAMERAS

A tailored selection of IP cameras will be used in the proposed system and will be selected based on suitability for each application, quality and whole of life performance. Cameras will be Aviligon or an approved equivalent.

All cameras and recorders will be monitored for video failure, network failure, recording failure and other diagnostic type alarms. Upon receipt of these alarms, the VSS will notify the operator and transmit the alarm to the security system for audit and logging purposes.

Cameras will be recorded on existing servers.

12. APPENDICES

APPENDIX A: CT IMAGING DRAWING LIST

DRAWING NUMBER	DRAWING NAME
MUH-EL-JHA-CT-DRG-0000	COVER SHEET AND DRAWING LIST
MUH-EL-JHA-CT-DRG-0001	LEGEND OF SYMBOLS AND GENERAL NOTES
MUH-EL-JHA-CT-DRG-1000	ELECTRICAL SINGLE LINE DIAGRAM 1
MUH-EL-JHA-CT-DRG-1001	ELECTRICAL SINGLE LINE DIAGRAM 2
MUH-EL-JHA-CT-DRG-1003	COMMUNICATIONS SINGLE LINE DIAGRAM
MUH-EL-JHA-CT-DRG-1005	ELECTRICAL SINGLE LINE DIAGRAM 3
MUH-EL-JHA-CT-DRG-1006	ELECTRICAL SINGLE LINE DIAGRAM 4
MUH-EL-JHA-CT-DRG-1010	CT IMAGING EXISTING AND DEMOLITION PLAN
MUH-EL-JHA-CT-DRG-2000	ELECTRICAL SITE LAYOUT
MUH-EL-JHA-CT-DRG-3100	CT IMAGING LIGHTING LAYOUT
MUH-EL-JHA-CT-DRG-3200	CT IMAGING LIGHTING CONTROL LAYOUT
MUH-EL-JHA-CT-DRG-3300	CT IMAGING INFRASTRUCTURE AND CABLE CONTAINMENT LAYOUT
MUH-EL-JHA-CT-DRG-3400	CT IMAGING POWER AND COMMUNICATIONS LAYOUT
MUH-EL-JHA-CT-DRG-3600	CT IMAGING SECURITY LAYOUT
MUH-EL-JHA-CT-DRG-3700	CT IMAGING NURSE CALL LAYOUT
MUH-EL-JHA-CT-DRG-4000	LUMINAIRE SCHEDULE
MUH-EL-JHA-CT-DRG-4001	MSP SCHEDULE
MUH-EL-JHA-CT-DRG-4002	CABLE SCHEDULE
MUH-EL-JHA-CT-DRG-5000	MAIN SWITCHROOM DETAIL SHEET

APPENDIX B: CT IMAGING ICT GROUPINGS

APPENDIX C: CT IMAGING SECURITY PRINCIPLES MATRIX

APPENDIX D: CANCER CARE UNIT DRAWING LIST

DRAWING NUMBER	DRAWING NAME
MUH-EL-JHA-CC-DRG-0000	COVER SHEET AND DRAWING LIST
MUH-EL-JHA-CC-DRG-0001	LEGEND OF SYMBOLS AND GENERAL NOTES
MUH-EL-JHA-CC-DRG-1000	MAIN ELECTRICAL SINGLE LINE DIAGRAMS SHEET 1
MUH-EL-JHA-CC-DRG-1002	COMMUNICATIONS SINGLE LINE DIAGRAM
MUH-EL-JHA-CC-DRG-1003	LIGHTING CONTROL AND EMERGENCY LIGHTING SCHEMATIC
MUH-EL-JHA-CC-DRG-1011	CANCER CARE EXISTING AND DEMOLITION PLAN
MUH-EL-JHA-CC-DRG-3110	CANCER CARE LIGHTING LAYOUT
MUH-EL-JHA-CC-DRG-3210	CANCER CARE LIGHTING CONTROL LAYOUT
MUH-EL-JHA-CC-DRG-3310	CANCER CARE INFRASTRUCTURE AND CABLE CONTAINMENT LAYOUT
MUH-EL-JHA-CC-DRG-3410	CANCER CARE POWER AND COMMUNICATIONS LAYOUT
MUH-EL-JHA-CC-DRG-3610	CANCER CARE SECURITY LAYOUT
MUH-EL-JHA-CC-DRG-3710	CANCER CARE NURSE CALL LAYOUT
MUH-EL-JHA-CC-DRG-4000	LUMINAIRE SCHEDULE
MUH-EL-JHA-CC-DRG-4001	MSP SCHEDULE

APPENDIX E: CANCER CARE UNIT SECURITY PRINCIPLES MATRIX

APPENDIX E: CANCER CARE UNIT DRAWING LIST

APPENDIX F: MILTON HOPSPITAL ELECTRICAL INFRASTRUCTURE ASSESSEMENT REPORT.