

CAMPBELLTOWN HEALTH SERVICE REDEVELOPMENT

DECEMBER 2017

ICT Strategy



Document status and revision history

Version	Author	Issue date	Revisions
0.1		12/12/2017	Draft
1.0		20/12/17	Updated clinical & corporate systems, Cost plan, and other
1.1	Root Partnerships	29/05/18	Feedback from Director, Capital Works & Infrastructure

TABLE OF CONTENTS

1.0	Executive Summary	1
1.1	References	2
2.0	Development of the Campbelltown Health Service Redevelopment ICT Strategy.....	3
2.1	Background and Approach.....	3
2.2	The Five Foundations	4
2.3	Delivering a Clinical and Corporate Outcome.....	6
2.4	Project Management – key documents.....	6
2.5	ICT Scope Elements.....	7
2.6	ICT Clinical and Corporate Systems Strategy	8
2.7	ICT Infrastructure Strategy.....	9
2.8	ICT Operational Strategy.....	10
3.0	Construction Scope	11
3.1	New and Refurbished buildings	12
3.2	Floors that will not be refurbished	12
4.0	Funding Sources and Budgets.....	14
4.1	Capital Items	14
4.2	Professional Services for installation and commissioning of Capital items.....	14
4.3	Transition	14
4.4	Recurrent Budget	14
4.5	Procuring Capital items and Support & Maintenance together	14
5.0	Procurement Approach	15
5.1	Relationship to non-ICT FF&E	15
6.0	Clinical Systems & Corporate Systems.....	16
6.1	Existing Clinical & Corporate Systems.....	16
6.2	Planned Clinical & Corporate Systems.....	17
6.3	Potentially New Clinical & Corporate Systems for consideration.....	19
7.0	ICT Infrastructure	22
7.1	ICT Infrastructure Scope – New and refurbished buildings	23
7.2	Whole of Campus ICT Infrastructure	27
8.0	Other Potential Innovation	32
8.1	Process Redesign.....	32
8.2	Potential Clinical & Corporate System Innovation.....	32
8.3	Feasibility of Potential Innovation	40
9.0	ICT Design Principles and Guidelines – Infrastructure	41
9.1	Structure Cabling and Data Networks	41

9.2	Integration with Group 1 Systems	41
9.3	LHD ICT Standard Vendors and Models of Equipment	42
9.4	Business Continuity	42
9.5	Hybrid Communication Rooms and Computer Room	43
9.6	Networking	44
9.7	Structured Cabling	45
9.8	Telecommunication Services	49
9.9	Data Network	50
9.10	Networking of Group 1 ICT Systems	51
9.11	Telephony	52
9.12	Mobile Phone Coverage – Distributed Antenna System (DAS).....	53
9.13	PCs, Printers, MFDs	53
9.14	Video Conferencing & TeleHealth.....	55
9.15	Applications – Configuration for the new Facility.....	56
9.16	Computer Room Relocation.....	56
9.17	Major Medical Equipment	56
9.18	Messaging and Duress	57
9.19	Patient Entertainment System.....	60
9.20	3RD Party Organisations that are On Site	61
9.21	Data Network and Communication Systems Implementation before Construction Handover 61	
9.22	Building Naming, Room Naming & Way Finding.....	62
9.23	Sequencing of Commissioning	62
10.0	ICT Design Principles and Guidelines – Operational	66
10.1	Service Levels Required	66
10.2	Support Models.....	66
10.3	Personnel	66
10.4	RMR Budget	66
11.0	Cost Plan	67
11.1	Allowances for Clinical and Corporate Systems.....	67
11.1	Allowances for ICT Infrastructure	68
11.2	Potential Innovations Allowance	69
12.0	Appendix A – Risk Log	72
13.0	Appendix B – Implications for Group 1.....	73
14.0	Appendix C – Budget worksheets.....	81

1.0 Executive Summary

The Campbelltown Health Service redevelopment project provides an opportunity to improve ICT infrastructure as well as the clinical & corporate systems that serve the campus. These ICT elements are in a constant state of change and improvement even without the redevelopment as that is the nature of technology. The redevelopment project presents an opportunity to accelerate change and to consider innovation.

Technology that alters the way clinicians work must be driven as a formal change management exercise, led by clinicians.

The ICT strategic objectives are identified as:

- To position Campbelltown Hospital so that it is well placed to be able to deploy new clinical and corporate systems both immediately and in the future. This will be achieved by building a best practice Local Area Network (LAN) and Wireless LAN (WLAN)
- To improve communication within the facility via a “best practice” telephone and communication system
- Be prepared for the increasing reliance on ICT applications by making PCs, laptops and mobile computing devices more accessible to clinicians
- To be ready to deploy ICT services that assist the either South Western Sydney Local Health District (SWSLHD) or Campbelltown Hospital to achieve its strategic goals
- To improve key processes used in the facility by applying technology in new ways.

This strategy does not limit itself to those ICT matters that are directly part of the Campbelltown health service redevelopment; it also considers the state of ICT across the whole campus. It does this by addressing 5 foundations of ICT;

- ICT infrastructure in new & refurbished buildings
- Whole of campus ICT infrastructure
- Existing and planned Clinical & Corporate systems
- New Clinical & Corporate systems
- Other Innovation Opportunities

This strategy includes a process where the feasibility of each potential scope item can be analysed, its benefits articulated and priorities set. This allows for new items to be considered as the redevelopment project moves towards completion in 2023.

Funding for all elements of this strategy is not certain but this holistic strategy will allow the LHD and the redevelopment project to consider the best investment options for the campus. Funding may come from the redevelopment project, LHD, eHealth or through contribution from industry in the case of mobile telephone coverage.

This document will be used to inform the Campbelltown Hospital Redevelopment Cost Report and will be included in the Final Business Case submitted by NSW Health Infrastructure.

1.1 References

This section provides details of any source documents used in the preparation of this document.

1. NSW State Health Plan – Towards 2021
2. eHealth Strategy for NSW Health 2016-2026
3. South Western Sydney Local Health District strategic plan DRAFT 2018 - 2021
4. South Western Sydney Local Health District Information Communications and Technology Strategy – 2015-2021
5. South Western Sydney Local Health District Generic cabling specifications and installation practices – June 2017
6. “The Wireless Enabled Health Campus” by Luke Brindley
7. NSW Health ICT Cabling and Equipment Room Standard Version 2.1
http://intranet.hss.health.nsw.gov.au/__data/assets/pdf_file/0007/381058/NSW-Health-ICT-Cabling-Standard.pdf
8. NSW Health WiFi standard
http://intranet.hss.health.nsw.gov.au/__data/assets/pdf_file/0009/719523/NSW-Health-Wi-Fi-Standard.pdf
9. NSW Health Campus Blueprint Version 1.02
http://intranet.hss.health.nsw.gov.au/__data/assets/pdf_file/0018/258210/NSW-Health-Campus-Blueprint.pdf
10. Protecting People & Property: NSW Health Policy & Standards for Security Risk Management in NSW Health Agencies. Date of Publication: June 2013
<http://www.health.nsw.gov.au/policies/manuals/Pages/protecting-people-property.aspx>
11. Video Conferencing for Telehealth - Technical, Security, and Privacy Standards
http://intranet.hss.health.nsw.gov.au/__data/assets/pdf_file/0016/304216/NSW-Health-Telehealth-Technical-Security-and-Privacy-Standards.pdf
12. HI Systems and Equipment Guide V4.0 May 2016
http://hiintranet.health.nsw.gov.au/Solutions1/Design%20and%20Scope/Systems%20and%20Equipment%20Guide_V4.0_formatted.docx
13. NSW Health - Engineering Services Guidelines. GL2016_020 Published 26/8/2016

2.0 Development of the Campbelltown Health Service Redevelopment ICT Strategy

2.1 Background and Approach

The Campbelltown Health Service redevelopment ICT strategy recognises the opportunity to introduce improvements in healthcare that are enabled by new and improved ICT systems and infrastructure.

Those business improvements, both clinical and administration, and the general objectives of the Campbelltown Health Service are driven by the strategies of South Western Sydney LHD, NSW Health and eHealth NSW.

Key documents that inform the development of the ICT strategy for the Campbelltown redevelopment are;

- NSW State Health Plan – Towards 2021
- eHealth Strategy for NSW Health 2016-2026
- South Western Sydney Technology Enablement Strategy – 2016-2026
- South Western Sydney Local Health District strategic plan DRAFT 2018 - 2021
- South Western Sydney Local Health District Information Communications and Technology Strategy – 2015-2021

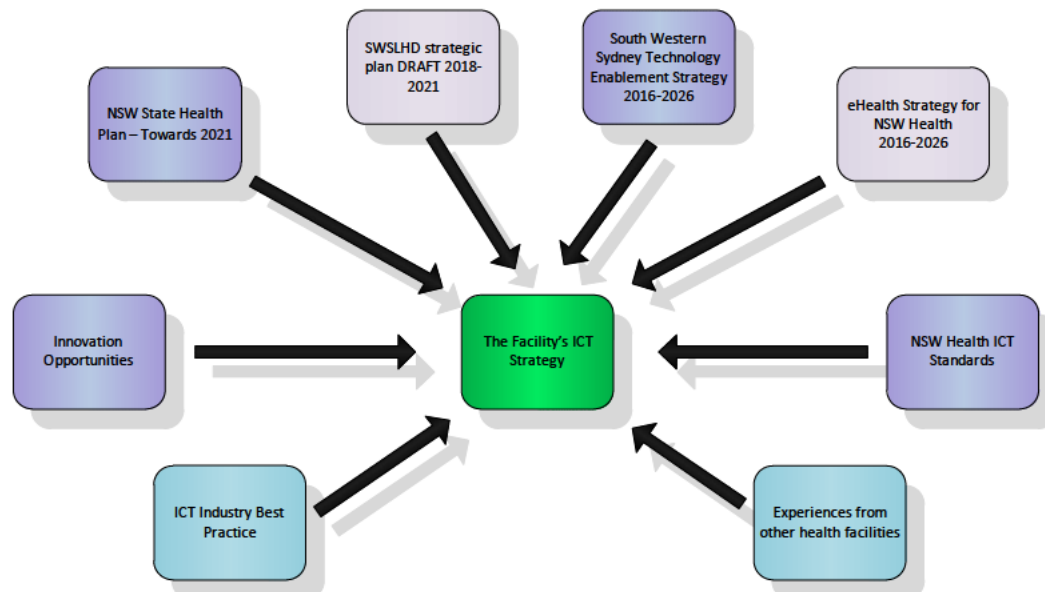


Figure 2-1 Contributing elements for ICT Strategy Development

In addition, Health Infrastructure provided a visioning presentation that described

- standard ICT infrastructure scope of a healthcare facility redevelopment
- consideration for clinical and administration systems to be deployed in the foreseeable future
- opportunities for innovation, based on experiences in other healthcare facilities and industry trends

Experiences from other redevelopment projects in the SWSLHD and other LHDs those have been considered in the development of this ICT strategy.

2.2 The Five Foundations

This ICT strategy contemplates the Campbelltown Health Service campus at the completion of the redevelopment project in 2023. There are 5 foundations on which this strategy is built;

- Existing and planned Clinical & Corporate systems
- New Clinical & Corporate systems
- The ICT infrastructure in new & refurbished buildings
- The whole of campus ICT infrastructure
- Other Innovation Opportunities



Figure 2.2 The Five Foundation of the ICT strategy

2.2.1 Existing and planned Clinical & Corporate systems

The South Western Sydney Local Health District (SWSLHD) has a suite of clinical and corporate systems in use today. The Campbelltown Health Service, as a hospital within the SWSLHD, uses those same systems.

These systems may be planned, implemented and administered by the SWSLHD, eHealth or a combination.

In addition, new and upgraded clinical and corporate systems are planned.

The redevelopment project will consider the systems, the change management required to deploy new systems and the timing of the implementation. This is both to take advantage of opportunities the redevelopment might present and to ensure timing is appropriate.

The details of these systems is given in Sections *6.1 Existing Clinical & Corporate Systems* and *6.2 Planned Clinical & Corporate Systems*.

2.2.2 New Clinical & Corporate systems

The redevelopment provides an opportunity to consider new clinical and corporate systems that can assist the campus to achieve its strategic objectives.

The details of these systems is given in Section *6.3 Potentially New Clinical & Corporate Systems*.

2.2.3 ICT infrastructure in new & refurbished buildings

Every new health building requires a set of ICT infrastructure. That scope is well documented by NSW Health Infrastructure and included in redevelopment scope and budget. Buildings that are refurbished will include a refresh of ICT infrastructure depending on the level of refurbishment.

The details of this are given in Section *0*



ICT Infrastructure Scope – New and refurbished buildings.

2.2.4 Whole of campus ICT infrastructure

As described in the reference document “The Wireless Enabled Health Campus” infrastructure that delivers WiFi and mobile phone coverage to an entire campus enables the use of a wide range of systems. These can bring significant benefit to a healthcare campus.

The details of this are given in Section 7.2 *Whole of Campus ICT Infrastructure*.

2.2.5 Other Innovation Opportunities

Lessons from other redevelopment projects, industry trends and new technologies present opportunities for innovation. The emphasis is on proven solutions rather than entrepreneurial opportunities due to the risk.

Section 8.0 *Error! Reference source not found.* describes potential innovations that are to be considered during the “detailed design” phase of the redevelopment project.

2.3 Delivering a Clinical and Corporate Outcome

Technology that alters the way clinician work must be driven as a formal change management exercise, led by clinicians. The ICT team can be seen as a partner, but not as the lead.

This ICT strategy describes many clinical and corporate systems as well as ICT infrastructure that directly affects the way clinicians and non-clinical staff work. To deliver this strategy successfully, it must be run as a clinical and corporate driven project, with ICT as an enabler.

A robust Change Management effort is essential as technology impacts existing processes. Process re-engineering may bring further change in order to realise new benefits.

2.4 Project Management – key documents

This document, the “ICT strategy” provides scope, budget and guiding principles. When the redevelopment project moves into Delivery phase, a detailed ICT plan will be created. That document is called the “Project Delivery ICT Plan”.



Figure 2-3 Primary Project Management documents

2.5 ICT Scope Elements

The key scope elements of the redevelopment represent broadly how ICT is executed and administered;

- ICT Clinical & Corporate Scope
 - The applications & systems that are used by clinicians, patients and administrators
 - Considering what is already in place in the facility and what is already planned for deployment by the LHD or eHealth
 - Considering any system that is not already in place nor planned, but that would add significant benefit to the facility
- ICT Infrastructure Scope
 - The ICT infrastructure of a facility. For example; data networks, telephony, PCs and cabling
- ICT Operational Strategy
 - The ongoing maintenance and support strategies of the systems and infrastructure
 - The financial impact of the ICT systems and infrastructure implemented in the redevelopment
 - The impact on LHD ICT staff

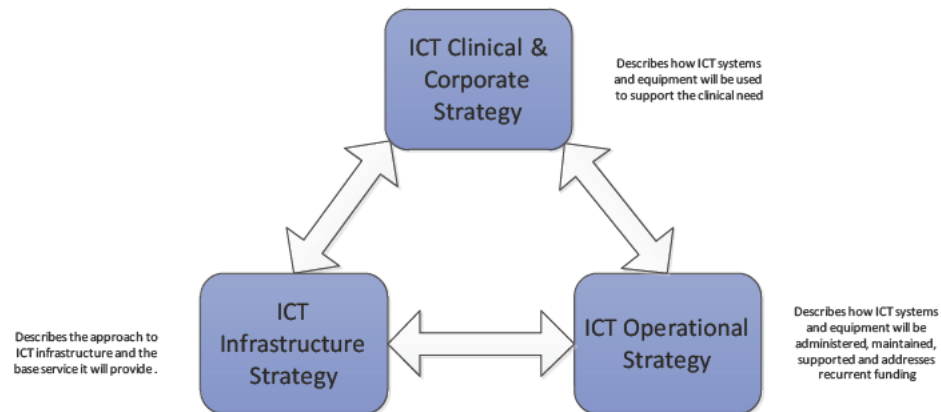


Figure 2-3: The diagram above illustrates how these 3 scope elements have interdependencies.

2.6 ICT Clinical and Corporate Systems Strategy

NSW public Healthcare facilities have a significant suite of clinical and corporate systems in use today. Additional systems are also planned by both the LHD and eHealth NSW. Those plans typically look several years ahead and are most often made without regard to whether a redevelopment is occurring. This recognises that the redevelopment has a limited influence on the suite of clinical & corporate systems that will be in place when the redevelopment is commissioned.

The ICT clinical strategy for the Campbelltown Health Service considers what other clinical or corporate systems will be introduced directly to take advantage of the opportunity the redevelopment provides. That may take the form of a change to implementation dates for already planned systems as well as new systems that have only become feasible due to the redevelopment.

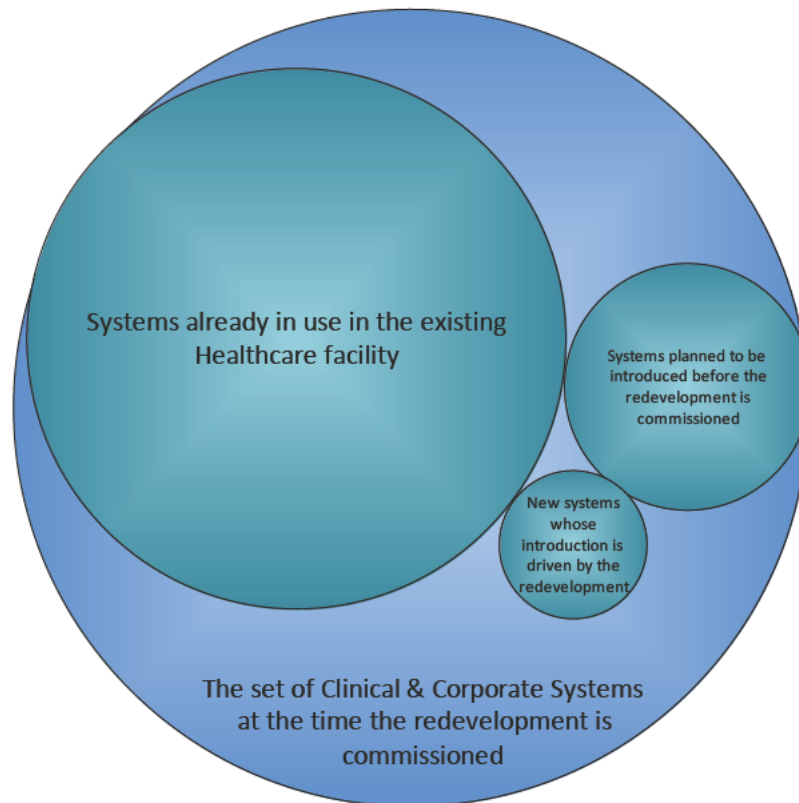


Figure 2.4: The set of all clinical & corporate systems used within the healthcare facility when the redevelopment is completed

2.7 ICT Infrastructure Strategy

The ICT Infrastructure Strategy describes the approach to ICT infrastructure, the services it will provide and the scope.

As this redevelopment project will refurbish or replace effectively all buildings on site that require ICT infrastructure, the ICT Infrastructure strategy assumes the replacement of all existing Group 1 related ICT infrastructure, much of the data network active equipment and also the telephone system. This is a significant advantage for this facility as it will provide it with a refresh of ICT infrastructure.

The old and the new ICT infrastructure will interconnect for the period when both old and new buildings existing during construction. As buildings are decommissioned, so their ICT infrastructure will also be decommissioned. Detailed transition and commissioning plans will be developed in the “Project Delivery ICT Plan”.

This ICT plan is primarily concerned with the implementation of the equipment and services to meet the ICT Infrastructure strategy. As such it does the following:

- Describes the scope for that infrastructure
- Provides ICT Design Principles and Guidelines

- Provides a cost plan
- Provides a project schedule

2.8 ICT Operational Strategy

The ICT Operational Strategy is concerned with how ICT systems and equipment will be administered, maintained and supported. This includes addressing recurrent funding and staff.












This plan assumes the Campbelltown ICT Operational Strategy will mirror the existing approach to ICT operations throughout the SWSLHD.

A Financial Impact Statement (FIS) is prepared for the redevelopment project. This plan should influence that FIS for recurrent ICT costs and staffing FTE.

During detailed design, the operational strategy is to be confirmed.

3.0 Construction Scope

The Campbelltown Health Service Redevelopment (Stage 2) follows the \$134M stage 1 redevelopment which was completed in January 2016. Shown in the diagram below as building D.

- Current Logistics and Central Plant serving Buildings A, B & C located in Building B
-
-  Existing Main Entry
 -  Existing ED & Ambulance Entry
 -  Existing Building D Entry
 -  Existing Services Ring Main (Fire Hydrant, Fire Sprinkler, Potable Cold Water & Natural Gas)
 -  Existing Hospital Roads
 -  Existing Underground HV Cable
 -  Existing Substation
 -  Existing Main Switch Room (Buildings B & D)
 -  Existing Generators (Buildings B & D)
 -  Existing FH & FS Booster Valve Assembly
 -  Existing Hospital Buildings

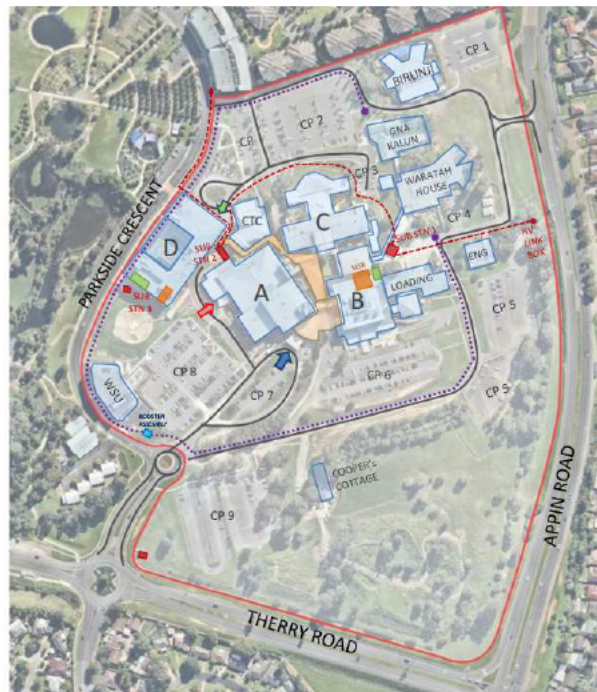


Figure 3.1: Existing Site. For illustration purposes only

Early works are expected to commence mid-2018. Main works are expected to commence in mid-2019 and completed in 2022. Refurbished areas are expected to be completed in mid-2023.

Pending business case approval, the redevelopment may include;

- Reconfiguration and expansion of the acute hospital
- Emergency department
- Theatres
- Inpatient units
- Intensive Care Unit
- Enhanced cancer centre
- Mental Health services
- Renal dialysis
- Paediatric services

3.1 New and Refurbished buildings

Upon completion of this redevelopment, there will be;

- a newly constructed Acute Services building (building E in the diagram below)
- a new car park (CP in the diagram below)
- new construction in and around existing buildings (ochre coloured areas adjacent to buildings A & B)
- refurbished areas (blue in the diagram below)
- fitout of shell space on the top 2 floors of building D

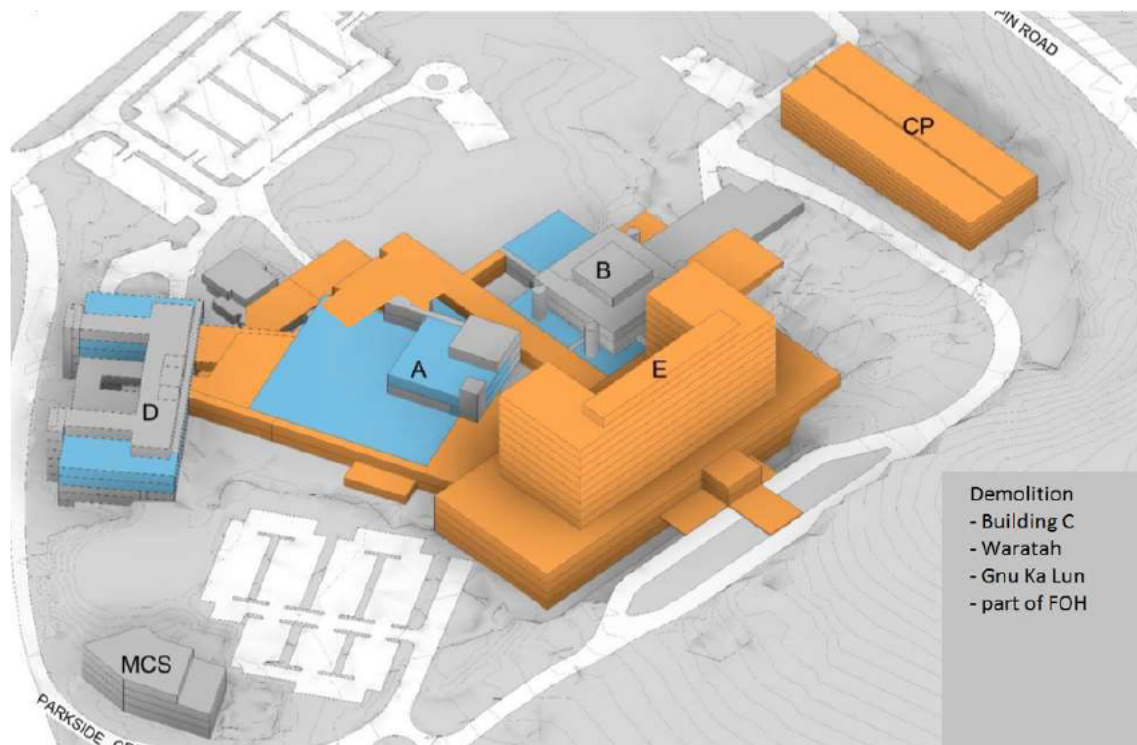


Figure 3.2: Future Site at 2023. For illustration purposes only

3.2 Floors that will not be refurbished

There are some floors in existing buildings that will have little or no refurbishment. Diagram below shows this in some detail.

The significance to ICT is that those floors without significant refurbishment may have a lower standard of ICT infrastructure than the buildings to be constructed.

This is key consideration of this strategy and is discussed in 2.2.4 Whole of campus ICT infrastructure and Section 7.2 *Whole of Campus ICT Infrastructure*.

DEVELOPMENT OPTION 1 - 1 BUILD: REFURB + NEW THEATRES (NEW BUILDING E (ASB) + REFURB EXISTING A, B & D)

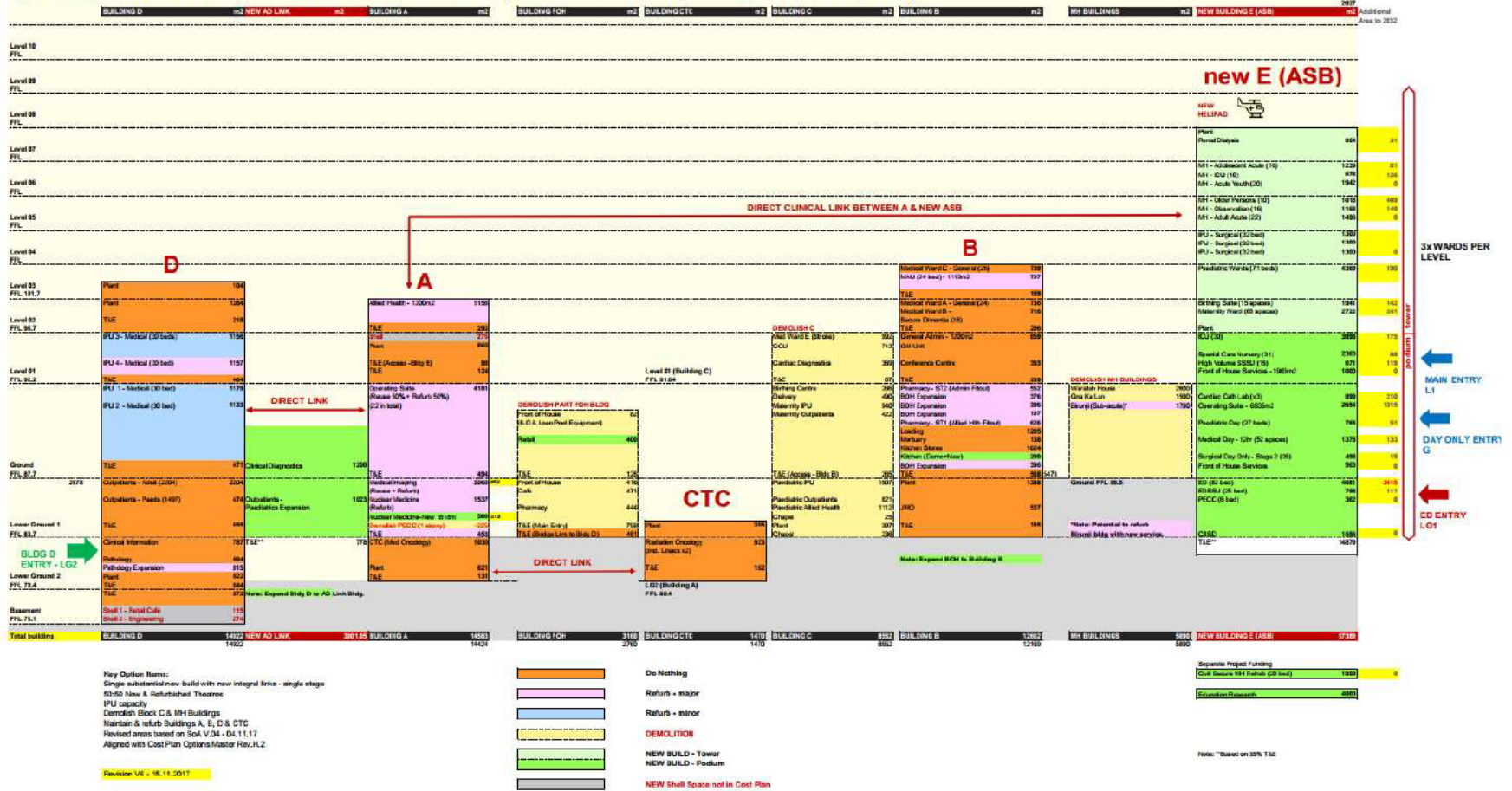


Figure 3.3: Buildings as at 2023. For illustration purposes only

4.0 Funding Sources and Budgets

A detailed ICT budget, with funding sources confirmed, is to be developed.

The guiding principles for that budget are;

4.1 Capital Items

Section 8 below, ICT Infrastructure Scope, lists capital budget items and indicates the funding source.

4.2 Professional Services for installation and commissioning of Capital items

The cost of professional services for the installation and commissioning of capital items is to be funded by the organisation that funds the capital item. For example; telephone handsets in the new building are funded by the redevelopment project, so the cost of professional services to install and commission those handsets will also be funded by the redevelopment project. Conversely, PCs being replaced because of their age are funded by the LHD and the cost of the professional services to rollout those PCs is also an LHD cost.

Professional services are usually engaged as a project cost to set up PCs etc on desks. There has been an allocation of funding for the installation of new devices. An exception will be when the LHD ICT team carries out the installation and commissioning, in which case it will be regarded as Business As Usual (BAU) activity and the cost will be borne by the LHD ICT team.

4.3 Transition

The cost to transition ICT related items from existing buildings and into the new and refurbished buildings will, in general, be funded by the redevelopment project. For example, reconnection of PCs after transfer will be carried out by the same team that installs new PCs in the new facility.

An exception will be when the items to be transferred can be dealt with by the LHD ICT team as a Business As Usual (BAU) activity.

4.4 Recurrent Budget

All recurrent costs are the responsibility of the LHD to fund. First year support and maintenance costs are regarded as recurrent and are not funded by the redevelopment project.

4.5 Procuring Capital items and Support & Maintenance together

It is usually advantageous for NSW Health to call for pricing and commercial contracts of capital items and their support & maintenance contracts in one procurement exercise even though they will be funded by different sources. This is because the procurement process tends to drive commercial benefits and lower prices.

5.0 Procurement Approach

The procurement of LAN, WLAN, telephony, duress and messaging equipment and services will be purchased under existing NSW state ICT contracts. To achieve best pricing, a competitive process using a Request For Quotation (RFQ) will be conducted. The NSW Government's "Procure IT" framework will be used. This makes use of suppliers on existing Panels, and gives the LHD freedom to selectively invite suppliers to respond.

Procurement of PCs, Printers, MFDs, Video Conference and Telehealth equipment will be done under existing LHD ICT contracts and agreements.

Procurement of professional services for minor works such as application reconfiguration will be done under existing LHD ICT contracts and agreements.

5.1 Relationship to non-ICT FF&E

NSW Health Infrastructure has a highly structured process for the procurement of Fixtures, Furniture and Equipment (FF&E). Procurement of ICT equipment and services is separated from non-ICT equipment for several reasons;

- ICT equipment often has existing standard models of equipment and standard vendors
- Determination of equipment to be purchased requires careful review by ICT subject matter experts in consultation with the facility.
- ICT equipment is often not room centric making it inappropriate to manage on a room by room basis as most non-FF&E is managed

Procurement of ICT equipment will, in general, follow the standard HI FF&E process including the use of CAR forms. However a single CAR form may be used for large quantities of equipment. For example, a single CAR form may be used to purchase all additional PCs, not one CAR form per PC. The ICT budget will be managed separately to the non-ICT FF&E. However both will be reported back to via the same governance.

6.0 Clinical Systems & Corporate Systems

There are 3 groups of Clinical and Corporate systems considered in this document.

(i) This document recognises the significant suite of Clinical & Corporate systems that are already in place in the existing Campbelltown Health Service.

(ii) There are additional Clinical & Corporate systems that are already planned, independently of the redevelopment, and that will be implemented before the redevelopment is completed. The timing of these may be influenced by the redevelopment.

(iii) There are potential new Clinical or Corporate systems that may be implemented in concert with the redevelopment. This is because the redevelopment provides an opportunity for innovation. This refers to system not already included in plans, as described above. Each potential system will be examined on their own merit and subject to feasibility and funding one or more may implemented.

6.1 Existing Clinical & Corporate Systems

For completeness the existing core Clinical & Corporate systems are shown in the table below.

Names of existing systems	Brief description
eMR	Electronic Medical Record. Including; <ul style="list-style-type: none"> - SurgiNet (Operating Theatre) - FirstNet (Emergency Department) - CHOC (Community Health and Mental Health) - Scheduling - Single Document Scanning
Specialty modules – eg Anaesthetics	Speciality modules to enable different specialities a specialised user experience
iPharmacy	Pharmacy software provides the administrative aspects; including drug dispensing and inventory control.
RIS/PACS	Medical Imaging
eMaternity	Obstetrics
Pathology	Laboratory reporting
IIMS	Incident Management System
Endoscopy	Specialised procedural video camera enabled
iPM	Patient Administration System

Patient Journey Board	
CBORD	Patient meal management
Oracle	ERP, Finance
Staff Link	Staff and workforce
TRIM	Document management
AFM	Asset & Facility Management
HETI, LMS, CIAP	Staff education
Clinical costing & reporting	
HIE/EDWARD	Statutory reporting
Email	
IT Security services	
File & Print services	
Desktop SOE	
HealthNet	HealthNet is an eHealth NSW program that connects these disjointed systems. It provides NSW Health clinicians with secure and immediate access to a patient's recent medical history from across all NSW Local Health Districts and a patient's My Health Record.
Mobile Device Management	

6.2 Planned Clinical & Corporate Systems

Clinical & Corporate systems that are planned to be implemented for the Campbelltown Health Service before the redevelopment is commissioned includes;

Names Of Planned Systems	Brief Description	Estimated Implementation for Campbelltown	Funding Source
eMeds / EMM	Electronic Medication Management	TBA	LHD & eHealth
eAcute	Remote Patient Monitoring	TBA	LHD & eHealth
Cerner CPDI	Cerner Document Scanning	TBA	LHD & eHealth
eMR – Content 360	Forward batch scanning	TBA	LHD & eHealth
Regis	Research governance	TBA	LHD & eHealth
Skype for business	video and teleconferencing	TBA	LHD & eHealth
Guest WiFi	Wifi connectivity for guests	TBA	LHD & eHealth

RIS/PACs	Upgrade	TBA	LHD & eHealth
eMR 2c		TBA	LHD & eHealth
IIMS upgrade/replacement	The Incident Information Management System (IIMS) is the information system for the reporting and analysis of incident details	TBA	LHD & eHealth
Staff Link	StaffLink is the gateway to the Human Resources Information System (HRIS), Financial Management Information System (FMIS) and iProcurement.	TBA	LHD & eHealth
Powerchart ECG	This will be implemented by the LHD as part of the eMeds rollout.	2018	LHD
Bar Coded Wrist bands for patients	This will be implemented by the LHD as part of the eMeds rollout.	2018	LHD

6.3 Potentially New Clinical & Corporate Systems for consideration

There are a number of clinical and corporate systems that are known to bring significant benefit to a healthcare campus but that are not already in existence or planned for Campbelltown. The following describes these.

Names of Potential New Systems	Brief Description	Priority for Campbelltown (H/M/L)	Estimated Cost for Campbelltown	Funding Source
Powerchart Maternity	Maternity electronic medical record	TBD	TBD	Not yet identified
ICU electronic medical record	Electronic intensive care clinical documentation	TBD	TBD	Not yet identified
Closed loop observations	Vital signs being captured directly into the eMR. Uses Cerner's iBus.	TBD	TBD. Est. [REDACTED] if it is the first site in the LHD, or [REDACTED] otherwise	Not yet identified
Powerchart ECG	ability to receive, manage, display and report on electrocardiograms (ECGs) anywhere from within PowerChart	TBD	TBD	Not yet identified
CareAware Connect	A Nursing communication and workflow tool	TBD	TBD	Not yet identified
Powerchart Touch	Provides mobility on iPads for clinicians	TBD	TBD	Not yet identified
Patient Portal	A patient portal view that is integrated with the eMR	TBD	TBD	Not yet identified
Nursing Documentation	Adds to eMR2 and extends the nursing documentation to maximise electronic documentation	TBD	TBD	Not yet identified
Physician documentation	Implementation of documentation for physicians	TBD	TBD	Not yet identified
Patient Portal	Patient access to healthcare information	TBD	TBD	LHD
Patient Surveys	Feedback from patients about their experience in SWSLHD hospitals	TBD	TBD	LHD

6.3.1 Powerchart Maternity

Women's solutions collect pertinent information and integrate directly into the EHR. The entire pregnancy is documented in one location with real-time display, recording, storage and retrieval of fetal and maternal monitor data; providing consistent, up to date information available at the point of care.

6.3.2 ICU electronic medical record

The electronic Record for Intensive Care (eRIC) is an electronic clinical information system within an Intensive Care Unit (ICU) that integrates patient data every minute from multiple systems, to improve patient safety and provide better clinical decision-making.

6.3.3 Closed loop observations

Closed loop observations is the collection of vital sign observations directly into the eMR without the need for the clinical to write on a form nor type into the eMR.

This brings significant clinical benefits including collection of meta-data and the removal of transposition and typographical errors.

To achieve this in the Cerner eMR environment, the Cerner feature "iBus" is a prerequisite. In addition, the biomedical equipment measuring the patients' vital signs must be compatible to iBus. Equipment that is not compatible can be replaced in time for the commissioning of this initiative. Some of that replacement may be able to be achieved via attrition before the redevelopment is complete.

6.3.4 Powerchart ECG

Electrocardiogram (ECG) objects are digitized and accessed within the EHR providing physicians in the cardiology department the ability to receive and present ECG data in mere seconds after it is acquired. This eliminates the necessity for a separate ECG information system. The ability to receive, manage, display and report on electrocardiograms (ECGs) anywhere from within PowerChart.

6.3.5 CareAware Connect

CareAware Connect is a clinical mobility solution designed for a smart phone device to help improve efficiency by completing multiple workflows and coordinating communications using one device.

6.3.6 Powerchart Touch

PowerChart Touch supports fast, intuitive and smart workflows. It allows a provider to complete both ambulatory and inpatient workflows. PowerChart Touch also provides secure access to the EHR outside of the facility's walls. Enables one to securely document patient care on a tablet or

smartphone, meaning a clinician can keep a patient's electronic health record (EHR) up to date at the touch of a screen.

6.3.7 Patient Portal

SWSLHD services need to be digitally enabled via a number of channels such as the internet, social media, SMS, e-mail, online content and patient portals to meet changing patient/client and community expectations.

A SWSLHD initiative to give patients better access to their healthcare via a web portal. The use of Patient Portals and websites to send out information prior to any admission and allow patient/customer input to the process at the earliest possible stage.

6.3.8 Nursing Documentation

Helping nurses spend more time with their patients, and deliver the best possible care. Bedside devices integrated to the electronic health record (EHR) provide nurses with standardised terminology and workflows in every role, meaning less time is spent understanding systems and more time engaging with the patient. These workflows improve quality and give providers feedback on the time saved, allowing them to allocate staff more efficiently.

6.3.9 Physician Documentation

Cerner's physician solutions include more than 40 specialties – created by doctors for doctors – to improve the patient experience, allowing physicians to make the best clinical decisions at the right time. Not every doctor works the same way, which is why Cerner solutions let physicians customise screen layouts, patient lists, favourites and much more, allowing the ability to provide the best care with the fewest distractions.

6.3.10 Patient Survey

A SWSLHD initiative to use feedback from patients to help improve the healthcare services provide to them.

7.0 ICT Infrastructure

The NSW Health Infrastructure scope of ICT infrastructure included in new buildings constructed is well understood, documented and included in standard HI cost plans. The next section describes that scope.

However, any changes to the ICT infrastructure within buildings outside of the HI redevelopment scope is not addressed by the standard HI scope nor cost plans. That is typically for the LHD to address and fund.

Inconsistent infrastructure between old and new buildings can limit ICT enablement to the lowest common denominator. To avoid the missed opportunity of bringing the whole of campus to a higher level, this strategy suggests an investment in ICT infrastructure in the existing buildings should be undertaken. This is discussed in section *7.2 Whole of Campus ICT Infrastructure* below.

7.1 ICT Infrastructure Scope – New and refurbished buildings

The ICT infrastructure scope for the Campbelltown Health Service is based on the standard scope used across Health Infrastructure redevelopment projects.

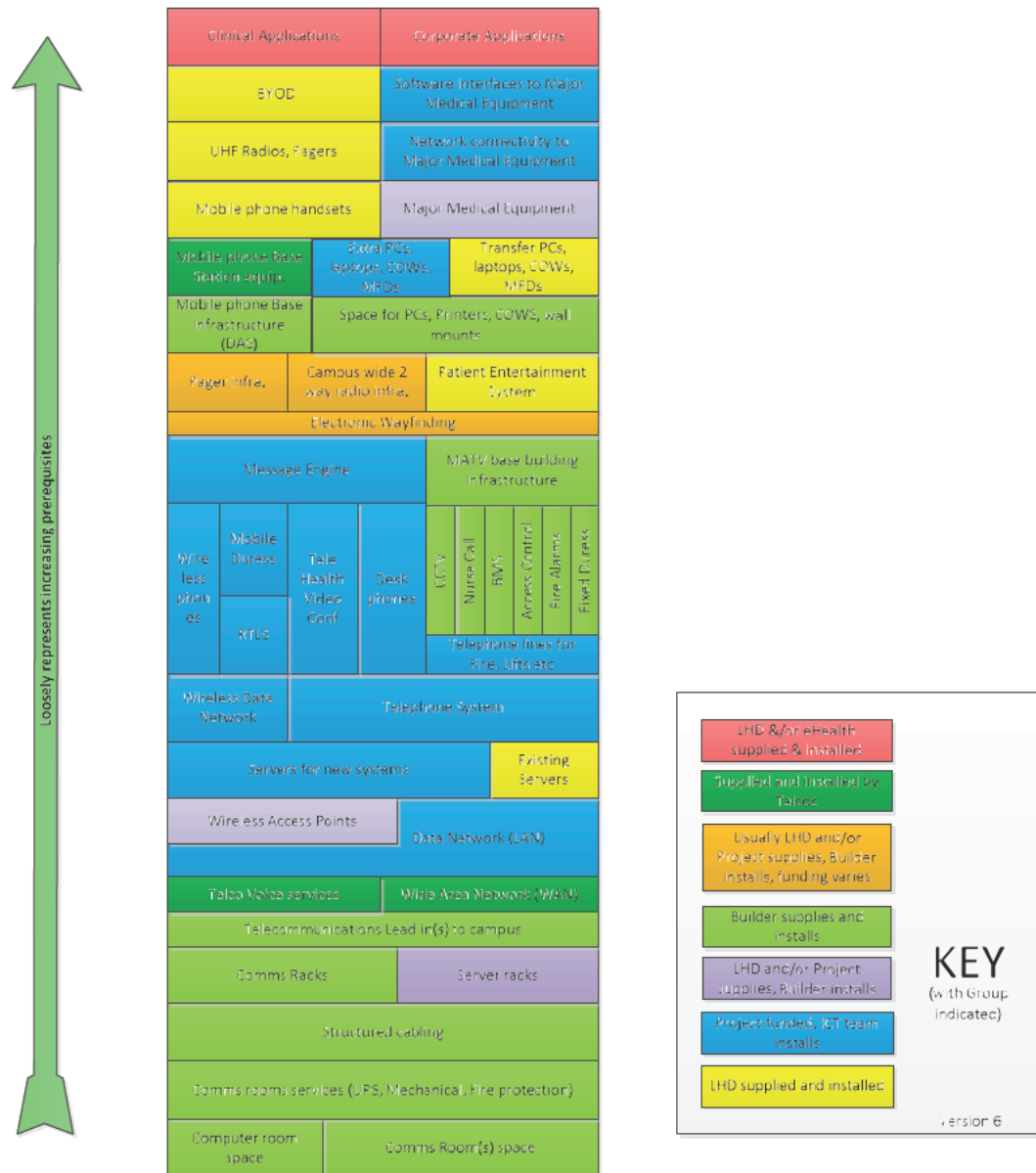


Figure 7.1 Indicative ICT infrastructure in a Health Facility

The following table summarises the ICT related services and shows whether they are in or out of the scope of this redevelopment.

Campbelltown Hospital Redevelopment	In Scope	Addressed by this Plan	Funding Source	Group 1/2/3	Comments
Structured data cabling	Yes	No	Redevelopment	1	This is a Group 1 item and it is addressed elsewhere.
Communications and Equipment rooms	Yes	Partially	Redevelopment	1	The concept of a hybrid room is discussed in the section below "Hybrid Communication Rooms and Computer Room". This is a Group 1 item and full details are addressed elsewhere.
New active wired LAN equipment	Yes	Yes	Redevelopment and LHD	3	New LAN active equipment will be implemented to quality network.
New active wireless equipment & RTLS	Yes	Yes	Redevelopment	2 & 3	New WLAN active equipment will be implemented to quality WiFi network.
New WAN services, equipment and trenching	Yes	Yes	LHD & Redevelopment	3	WAN connectivity, is a recurrent cost and as such is funded by the LHD. Trenching for telecommunication lead-ins is addressed by the redevelopment. Trenching outside the campus boundary to deliver telecommunication services to the campus is a matter for negotiation
Telephone system and handsets	Yes	Yes	Redevelopment and LHD	3	The LHD has standards for telephone systems and they will be followed for this redevelopment. Some services may be leveraged by infrastructure centralised in the LHD.
New fixed duress locations	Yes	Yes	Redevelopment	1 & 3	Fixed duress is partially a Group 1 system. See the section "Messaging and Duress".
New mobile duress devices	Yes	Yes	Redevelopment and LHD	3	See the section "Messaging and Duress".
Messaging Integration System	Yes	Yes	Redevelopment	3	See the section "Messaging and Duress".
Existing 2 Way Radios (UHF)	Yes	No	Redevelopment and LHD	1	The redevelopment will ensure there is sufficient signal coverage to support existing UHF radios in the new building. The LHD will transfer existing radio handsets.
New PCs and Printers to replace old equivalents	Yes	Yes	LHD	3	PCs and Printers will be transferred from the existing facility. LHD will attempt to synchronise the normal PC replacement cycle with the

Campbelltown Hospital Redevelopment	In Scope	Addressed by this Plan	Funding Source	Group 1/2/3	Comments
					commissioning of the new facility where possible.
Additional PCs and Printers due to increased capacity in the new facility	Yes	Yes	Redevelopment	3	Additional PCs and printers will be funded by the project only where that equipment is directly for increased capacity in the new facility. Where a device is required for a new position that did not previously exist, the funding of that device will come from the LHD as part of the funding for the new position.
New Video Conferencing & TeleHealth Equipment to replace old equivalents	Yes	Yes	LHD	2 or 3	Equipment will be transferred from the existing facility where possible.
Additional Video Conferencing & TeleHealth Equipment due to increased capacity in the new facility	Yes	Yes	Redevelopment	2 or 3	Additional Video Conferencing & Audio Visual Equipment will be funded by the project only where that equipment is directly for increased capacity in the new facility.
Computer Room/ Hosting Services Relocation	Yes	Yes	Redevelopment and LHD	3	To achieve the relocation of servers into the hybrid room that is described in section "Hybrid Communication Rooms and Computer Room", the LHD will provide resources and coordination however external parties will have to be engaged.
Application Reconfiguration for the new facility	Yes	Yes	LHD	3	No direct cost is anticipated over LHD BAU.
Servers or server infrastructure required for new systems implemented for this redevelopment	Yes	Yes	Redevelopment	3	The redevelopment may fund this equipment only where that equipment is directly required for one of the new systems being implemented.
Building specific systems	Yes	Partially	Redevelopment	1	Group 1 items such as BMS, Access control (security), Fire indicator panels, CCTV etc. are addressed elsewhere. However the integration with those systems and the use of the data network by those systems is included in this plan.
Major Medical Equipment	Yes	No	Refer to the MME plan.		Integration with Major Medical Equipment and the ICT infrastructure requirements of MME is included in this plan.

Campbelltown Hospital Redevelopment	In Scope	Addressed by this Plan	Funding Source	Group 1/2/3	Comments
Patient Entertainment System & MATV	Yes	Partially	To be determined	1	The LHD is to investigate its options as it already has a commercial agreement in place.
Guest WiFi	Yes	Yes	To be determined	3	eHealth is currently trialling a Guest WiFi solution that allows patients and other visitors to access the WiFi network and the internet. That system is expected to be implemented on this campus in the future.
Mobile phone coverage - Distributed Antenna System (DAS)	Yes	Yes	Redevelopment	1	This plan identifies the need for mobile phone coverage in the facility.
Nurse Call	Yes	Partially	Redevelopment	1	This is a group 1 item and is addressed in detail elsewhere.
CCTV	Yes	Partially	Redevelopment	1	
BMS	Yes	Partially	Redevelopment	1	The BMS is only mentioned in this plan with respect to integration to the MIE
Access Control System	Yes	Partially	Redevelopment	1	The Access Control System is only mentioned in this plan with respect to integration to the MIE and its role to provide Fixed Duress buttons.
Electronic Wayfinding	TBD	Partially	TBD		This is an innovation item that is yet to be determined to be feasible for this redevelopment
Pager transmitter	Yes	Partially	Redevelopment	1 or 2T	The existing pager transmitter may be able to be reused.
Pagers	Yes	No	LHD	3T	
Multi-Function Devices and other printers	Yes	Yes	LHD & Redevelopment	3 & 3T	
Mobile telephone handsets	Yes	Partially	LHD	3T	
Digital Operating Room	Yes	Partially	LHD & Redevelopment	2 & 3	The business requirements for DOR is to be determined. Interfaces between the DOR and LHD managed clinical & admin systems may need to be created/configured for this redevelopment
Clinical & Corporate Systems	Yes	Yes	LHD & eHealth	3	See "Clinical & Corporate Systems" section of this document.

Table 7-1 ICT Scope

7.2 Whole of Campus ICT Infrastructure

Consistent ICT infrastructure across a campus enables seamless operations across the campus. Conversely, inconsistent infrastructure can be a barrier to efficiency and safety.

7.2.1 Examples of the use of consistent campus wide infrastructure

The reference paper “The Wireless Enabled Health Campus” describes a range of clinical and non-clinical benefits that can be achieved when there is ubiquitous mobile phone and WiFi coverage across a campus.

The following is a summary of some of the examples given in that paper.

7.2.1.1 *Mobility and the delivery of clinical and non-clinical services*

Mobility is a key enabler of efficient clinical and non-clinical services across a campus. For example, a clinician who can initiate communication and be communicated with via voice and messaging, regardless of where on the campus they are, has significant advantage over the clinician who relies on fixed desk telephones.

The old communication model of each clinician having a pager and relying on it and fixed telephones is inefficient. Direct clinician to clinician communication is the contemporary model. That can include voice, messaging and other apps to communicate.

The devices that clinicians may use for this communication will include smart phones and WiFi phones & devices. This requires campus wide mobile phone coverage and WiFi coverage.

Non-clinical staff also benefit from voice and data communication across the campus. For example, security guards, porters, and maintenance staff can all benefit.

7.2.1.2 *Communicating Campus Wide Events*

There are a range of events that require the ability to communicate across the capus or large segments of it. Typically each requires mobile phone, WiFi coverage as well as a MIE. Examples includes;

- MET Calls (Medical Emergency)
- Duress events
- Fire Alarms
- Security monitoring via CCTV
- Security Access control, intruder alerts
- Building Management System alerts
- Public Address

7.2.1.3 Wayfinding

As the health campus grows in size, the complexity of navigating around it increases. For infrequent visitors to the campus this will be particularly daunting.

A campus wide wayfinding solution can assist by;

- Helping outpatients find their clinic
- Helping family and friends of admitted patients to find locate their loved ones
- Helping new staff to navigate the facility

Advanced wayfinding may include planning the best location to park a vehicle before attending the hospital.

Wayfinding that is not campus wide is clearly deficient.

7.2.1.4 Asset Tracking

There are a range of assets that increasingly need to be located quickly in a facility. RTLS across a campus is a means to achieve this.

7.2.2 Required campus wide infrastructure

The redevelopment will deliver contemporary ICT infrastructure in the new & refurbished buildings. However, those building that will untouched by the redevelopment will not have the same standard of infrastructure.

The table summarises the key infrastructure that should be consistent across a campus but that is known not to be without investment in excess of the standard redevelopment scope and budget.

	New Buildings	Refurbished Buildings	Existing Buildings	Extra required to achieve campus wide that is not in redev scope
Mobile telephone coverage	Coverage will be provided	Coverage will only be provided if the entire building is being refurbished	Only building D has coverage	Buildings A, B
WiFi (Wireless network)	RTLS grade	RTLS grade only in refurb areas	All existing buildings have lower than RTLS grade	All existing areas will require WiFi redesign; approx. double additional cabling & APs
Wired Network	Extension of the existing network	Extension of existing the network	The existing network is of a high standard	None
Structured cabling (Horizontal)	To be built to current NSW Health standards	To be built to current NSW Health standards	TBD	Extra cabling required for APs and maybe elsewhere too.
Structured cabling (Vertical)	To be built to current NSW Health standards	To be built to current NSW Health standards	Will be determined by the electrical consultant	Will be determined by the electrical consultant
Telephones (PBX)	Extension of the existing VoIP telephone system	Extension of the existing VoIP telephone system	Existing VoIP telephone system	None
Mobile Duress	Mobile duress using WiFi, RTLS and Messaging Engine	Mobile duress using WiFi, RTLS and Messaging Engine	Not using WiFi based mobile duress	Will need to be upgraded to Mobile duress using WiFi, RTLS and Messaging Engine
Fixed Duress	Will be integrated into the mobile duress solution	Will be integrated into the mobile duress solution	TBD	TBD
MET Calls (Medical Emergency)	Will integrate Message Integration	Will integrate Message Engine with Nurse Call and	TBD	Will require integration with

and other alerts via messaging	Engine (MIE) with Nurse Call and mobile phones, WiFi devices and pagers	mobile phones, WiFi devices and pagers		the MIE and end devices
Nurse Call	A solution that will integrate with the MIE	A solution that will integrate with the MIE	TBD	Will require integration with the MIE
BMS	TBD	TBD	TBD	Will require integration with the MIE
Fire Indicator Panels (FIP)	TBD	TBD	TBD	Will require integration with the MIE
CCTV	TBD	TBD	TBD	Will be determined by the electrical consultant
Access Control	TBD	TBD	TBD	Will be determined by the electrical consultant
Public Address System	In addition to EWIS, the telephone system can support a PA function. This may require the fitting of IP speakers in ceiling to provide sufficient coverage.	Same as new buildings.	TBD	Will be determined by the electrical consultant
Intercom	Intercom should not limit the staff to answering from a fixed point. Rather, intercom voice & video should be delivered to a device carried by staff.	Same as new buildings.	TBD	Will be determined by the electrical consultant
Wayfinding	A BLE based solution is a potential innovation	A campus wide solution is required using the same solution as for new buildings.	A campus wide solution is required using the same solution as for new buildings.	TBD

8.0 Other Potential Innovation

The redevelopment project provides an opportunity to innovate. This can be because new ICT infrastructure removes barriers or because the redevelopment provides an opportunity to redesign current clinical or administration practices.

8.1 Process Redesign

Patient safety and quality of care are 2 key drivers in a modern healthcare facility. Where the facility has sub-optimal safety or quality, process redesign can be brought to bear. It maps existing processes and redesigned them. Often ICT systems and equipment can enable the new process.

Process redesign must be clinically lead and have executive sponsorship. It is a significant Change Management piece. It is not led by ICT.

To commence this initiative the Campbelltown facility could create a list of potential target processes by;





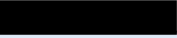

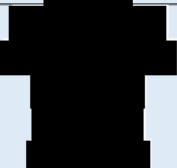
- Articulating known patient safety or quality issues in the existing facility
- Considering process redesign successes in other health facilities


With that target list, prioritise, then commence the exercise of mapping current processes, design new processes and measuring the feasibility.

8.2 Potential Clinical & Corporate System Innovation

Clinical & Corporate systems that are to be considered for implementation in line with the new facility are listed below. This is a list of potential systems; all are subject to feasibility and funding being available.

Function	Priority	Comment	Estimated Cost
Outpatient Queue Management	High	Assumes LHD has the necessary base headend infrastructure in place, plus experience from deployment in other facilities in the LHD	██████████
Clinician to Clinician voice and data communications	High	Assumes maximum 50 staff on duty at any time, each having a smart phone/device	██████████

Patient Entertainment System and Point of Care Computing	High	This requires a significant analysis piece to determine actual requirements before feasibility can be considered.	
Multi-Disciplinary Team meeting room; physical or virtual	High	Fitout of a physical meeting room is ~  Cost of a virtual room with all end points is TBD.	
My Food Choices	High	Collecting patients' menu selection at the bed side and recording consumption	TBD.
Workflow management for selected use cases eg: MET calls, bed turn over, porter calls, critical results	High	Requires Clinician to Clinician communications is already done. Allowance for 2 workflows to be implemented.	
Patient Wandering & Baby Theft	High	Leverages WiFi & RTLS	
Biomedical asset tracking	High	Requires campus wide RTLS	
Conversion of paper forms to eMR	TBD	This is the process of changing from paper forms to electronic forms	TBD
Back scanning of medical records into the eMR	TBD	The scanning of paper records and then linking the scanned document in the eMR. This is occurring as BAU at the moment, and the initiative can accelerate that.	TBD
Cerner 360 Content (Forward batch scanning)	TBD		
Mobile Telehealth video conferencing for diagnosis	TBD	The ability to take mobile video conference to the bed side for diagnosis or consultation	TBD
Digital dashboards	TBD		
Electronic Wayfinding	Medium	Requires BLE so the first number if BLE is not already in place.	
Hand Hygiene compliance	Medium	Requires BLE so the first number if BLE is not already in place.	
Stock control	TBD	This is adapting stock control methods from the corporate world and	TBD

		applying them to a hospital environment.	
Neonate pairing with mother	TBD		
Ambulance – aged care transportation advisory service	TBD		
Bedside, on demand video conferencing			
Integration with BYO wearables to collect telemetry			
Critical Results Reporting	TBD	Study the StG solution	Study the StG solution
Monitoring patients in the home			
Car park booking & full wayfinding journey from home & return			
Scheduling theatres & online check in			
Facsimile	TBD	Remove the use of facsimiles. Where that is not possible for a specific process, replace physical fax machines with fax gateway server(s).	TBD

8.2.1 Outpatient Queue Management

Outpatient queue management can deliver benefits of;

- Giving the patient a better experience through easier check in and reduced time in waiting rooms
- Allowing the health facility to measure how a patient's journey through the facility proceeds
- Allowing the health facility to better plan for demand

A Patient Flow Management solution may include;

- Kiosks and Smart phone apps that allow patients to register their presence in the facility for a pre-arranged appointment
- Display screens that allow a patient to see where they are in the queue for their scheduled appointment
- A means to call a patient to a clinic when their clinician is ready to see them. This frees the patient from waiting in the waiting room
- Integration with clinical and administration systems where details of a patient's appointment are held
- Reporting tools and dashboards

8.2.2 Clinician to Clinician voice and data communications

Clinician to clinician voice and data communication includes;

- Clinicians being able to make telephone calls to one another, reducing or replacing text paging
- The use of both WiFi and 4G handsets, as appropriate
- Applications on smartphones that support clinical & non-clinical processes. Example workflows that could be considered include; MET Calls, Critical results reporting, staff assist requests, bed turn over, duress alarms, security events, drug fridge alarms

8.2.3 Patient Entertainment System and Point of Care Computing

Patient Entertainment System (PES) is described in section 9.19 *Patient Entertainment System*.

Point of Care Computing is concerned with the device the clinician uses when by the bedside. The appropriate solution is to be determined during detailed design.

As a guide, the options and typical use cases are shown in the following table.

Use Case	Typical solutions
A nurse doing obs or updating eMR by the patients' bedside	WoW or a PC fixed by the bed.
A nurse administering drugs using EMM	WoW or a PC fixed by the bed.
Grand rounds	Wow
Consultation with the patient by the bed including showing results etc in the eMR	WoW or a PC fixed by the bed, or a PC integrated into the PES.

8.2.4 Multi-Disciplinary Team meeting room; physical or virtual

The multi-disciplinary team meeting room (MTM) is a physical or virtual place that allows clinicians to collaborate concerning the holistic care of a patient. This is most likely to be used for complex cases.

A physical manifestation of an MTM may resemble a large meeting room with multiple large LCD screen to allow for the display of medical imaging and other data relevant to the patient.

A virtual manifestation of an MTM facilitates the sharing of “screens” of information, voice and video by clinicians regardless of their physical location. They could join the conversation of another meeting room with purpose built Audio Visual equipment, or from a PC, tablet or smartphone.

The innovation proposed is to investigate the development of virtual MTMs using contemporary end point devices, a bridge to join them, and the processes to support the use.

An MTM could be used for the following purposes;

- Pre-surgical collaboration
- Preparation for an inbound emergency patient with multiple injuries
- Pre-discharge of a patient requiring multi-disciplinary post hospital care
- Collaboration concerning a deteriorating patient with an acute condition

8.2.5 My Food Choices

My Food Choices is a solution developed by HealthShare to address patients' selection of food from a menu and the recording of consumption. Benefits to the patient include the selection of food closer to the time of consumption. Benefits to the facility include the monitoring of consumption for dietary reasons.

8.2.6 Workflow Management

Workflow management is the implementation of advanced work flows on clinician smartphones as described above in "Clinician to clinician voice and data communication".

Example workflows that could be considered include; MET Calls, Critical results reporting, staff assist requests, bed turn over, duress alarms, security events, drug fridge alarms and porter call.

8.2.7 Patient Wandering & Baby Theft

This concerns the use of a device worn by the patient or new born that includes a sensor that can trigger an alarm if that person passes through a nominated doorway. This allows staff to be alerted to a wandering patient or a baby being removed from the facility without authority.

The solution can be based on WiFi only, or WiFi & BLE, or be a part of the Nurse Call system.

8.2.8 Biomedical Asset Tracking

Biomedical asset tracking allows staff to easily locate biomedical equipment visually on a floor plan as well as report on location and use.

Benefits include;

- easier to locate equipment which results in an estimated 20% or more reduction in biomedical equipment that is need on campus
- reduced time for staff to locate equipment
- easier for biomedical engineers to monitor and manage the equipment

8.2.9 Conversion of paper forms to eMR - Moving Away from Paper Forms

This involves the review of each paper form and ultimately its obsolescence as it is replaced by direct entry into the eMR or PAS.

A simple maturity model of forms;

Level 1. Handwritten paper forms

Level 2. Scanning a simple paper form - produces a PDF that's not good for data reuse, requires a significant scanning effort

Level 3. Redesigning a paper form to allow data to be extracted during scanning – can be good for data reuse, still requires a significant scanning effort

Level 4. Direct manual data entry into the eMR - reusable data, no scanning, opportunities for validation and decision support

Level 5. Automated data capture (See Closed Loop Observations)

The implementation of back scanning of medical records can deliver the following benefits

- Complete medical record in an electronic format
- On-line access to the medical record for clinicians
- Physical storage space does not need to be built xx

8.2.10 Scanning Paper forms

Scanning a paper form is noted above.

The implementation of Cerner 360 Content can deliver benefits of:

- Complete medical record in an electronic format
- Reduction in long term storage requirements
- On-line access to the medical record for clinicians

8.2.11 Mobile Telehealth video conferencing for diagnosis

Mobile telehealth video conferencing allows a mobile device, commonly a WoW with camera & audio, to be able to be brought to patients' bedsides. The remoter part may be a specialist or senior physician.

8.2.12 eMR Digital Dashboards

There has been significant benefit realised by facilities that can design and make use of dashboards that reflect current clinical status of a targeted cohort of patients. Examples include;

- a dash board of diabetic patients in an IPU
- a dash board showing risk factors of in an IPU

The benefit is that with a well-designed dashboard, clinicians quickly can see indicators of issues with patients so that they can then attend those patients without having to first conduct rounds of all patients.

8.2.13 Electronic Wayfinding

Electronic wayfinding concerns wayfinding for patients and their visitors. It can include;

- Kiosks that show a map
- Kiosks that show a map and also print directions

- Kiosks that show a map and send that map to a person's phone as a static image
- A smartphone application that navigates the person to their destination turn-by-turn

8.2.14 Hand Hygiene Compliance

Hand hygiene is recognised as an essential element to reduce hospital acquired infection. Compliance is commonly monitored via audits that has the auditors observing staff for a limited period. An alternate approach is to use technology to monitor compliance. The technical solution includes staff wearing a device and each hand hygiene station and patient bed having sensors. The system can then recognise when a staff member has visited a patient but did not visit the hand hygiene station first.

8.2.15 Stock Control

Stock control is the management of consumables within the facility. The benefits can include the reduction on the quantities needed on site, reducing stock waste through past used by date and order low stock automatically.

Stock control systems often also leverage buying power.

8.2.16 Neonate pairing with mother

Pairing a neonate with its mother includes the use of a device of the mother and the baby that sense one another, and sound an alert when the wrong combination come in contact and sound a confirmation when the correct pair come in contact.

This has the benefit that a baby given to the wrong mother, for example for feeding, is quickly identified.

8.2.17 Ambulance – Aged care transportation advisory service

Under trial in the Hunter New England, is an advisory service that aged care facilities can contact in the event of a medical issue with a patient. Those facilities would otherwise request an ambulance to transport the patient to hospital as staff have limited clinical skills. This has reduced the number of transportations and subsequent admissions significantly. This benefits the patient, NSW Ambulance, and the hospital.

8.2.18 Bedside, on demand video conferencing

This allows for on demand video conferencing from the patients bed. One use case is where the patient is contacting family and friends. Another is for a clinical consultation.

8.2.19 Integration with BYO wearables to collect telemetry

Many people now have a personal, wearable device that records information such as activity, sleep, pulse and more. This information may be useful for a clinician to collect. This initiative considers the

clinical value of that information and whether it should be collected to complement traditional telemetry collection devices.

8.2.20 Critical Results Reporting

St George hospital has undertaken an initiative to address critical results reporting. This considers and addresses;

- “Pushing” notifications to clinicians that a result is available
- An additional alarm to the clinician when a result shows an adverse result
- Eliminating redundant tests ie: those that are not read by the ordering clinician

8.2.21 Monitoring patients in the home

The CSIRO has undertaken a study that monitored chronic patients in the home. This made use of devices that could take observations and transmit results back to a clinician for review. The outcome was a reduction in admission rates and a better experience for the patients.

8.2.22 Car park booking & full wayfinding journey from home & return

This initiative extends electronic wayfinding to include the journey from the home to the hospital. It integrates navigation to the health campus and access to car parking or public transport. It builds on wayfinding, outpatient appointments and theatre scheduling.

8.2.23 Scheduling theatres & online check in

This initiative allows patients to do much of the pre-surgical check in online. This can assist patients by allowing doing this from home at a time that suits them and by providing a checklist specific to their planned procedure. It assists staff by reducing the clerical effort. Theatre scheduling, to improve utilisation, is also considered by this initiative.

8.2.24 Facsimile

Remove the use of facsimiles. Where that is not possible for a specific process, replace physical fax machines with fax gateway server(s).

8.3 Feasibility of Potential Innovation

The process to determine which if these will be considered for implementation is;

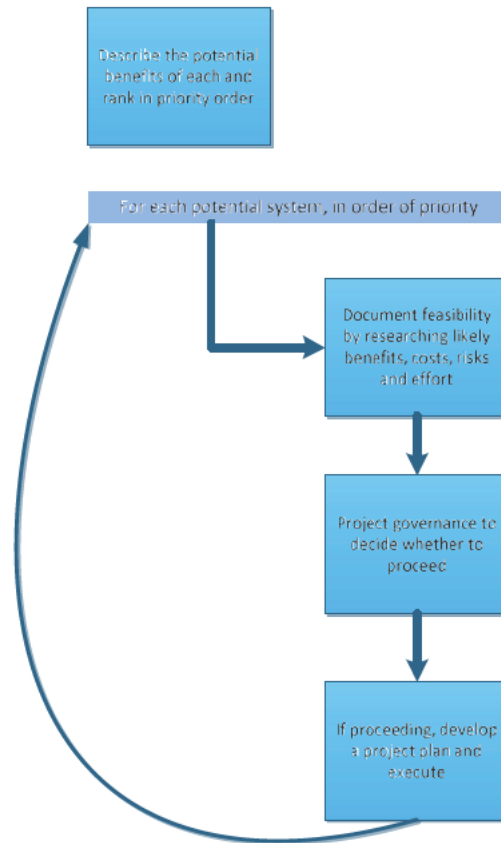


Figure 7.3: Process of feasibility testing of potential innovations

9.0 ICT Design Principles and Guidelines – Infrastructure

This section describes the ICT Design principles and guidelines to be used when executing this plan and creating the detailed design.

The following sections describe specific guidelines for this health facility.

9.1 Structure Cabling and Data Networks

The structured cabling for the redevelopment will be built to NSW Health Cabling standards.

The data network, both LAN & WLAN, will be designed in line with NSW Health guidelines and LHD standard practices. The network will be constructed alongside the existing network and interconnected to allow for continuous operation of all occupied buildings.

9.2 Integration with Group 1 Systems

A number of systems will be installed and commissioned under the builder's scope. Ie: Group 1 systems. Some of these will require interconnection to the Group 3 ICT systems. This will be achieved via the Message Integration Engine (MIE).

This will require coordination with the builder for both specification and commissioning.

Group 1 System	Reason for Interconnection
Nurse Call	Messages generated by the N/C system can be passed to phones, pagers etc. MET calls is an example
Fixed Duress	Fixed duress event messages from the Access control system will need to follow the same process as mobile duress event message which are generated by a Group 3 system. To achieve that consistency, Fixed duress messages must be passed to the MIE
BMS	Select event messages from the BMS should be passed to the MIE so that they can be delivered to select non-engineering staff. For example, a drug fridge alert may be sent to the NUM.
FIP	Fire alarm messages may be sent to select staff who need to be aware of that alarm. This overcomes the problem where the person is out of hearing distance of traditional fire alarm bells.
Access Control	Select event messages from the Access Control System should be passed to the MIE so that they can be delivered to select. For example, a door is opened after hours that should always be closed may be sent to security personnel.

9.3 LHD ICT Standard Vendors and Models of Equipment

It is common practice for an LHD ICT team to define vendor and equipment standards across the LHD. This is done for many reasons including supportability, economies of scale and risk minimisation. Interoperability and consistency of maintenance practices with the installed base of network and telephone equipment on the site and across the LHD is also a key determining factor in equipment selection.

It is also good practice to have a continuous process of review of these standards.

Examples of these standards currently in use in the SWSLHD include;

- Cisco as the telephony vendor for Campbelltown
- Cisco as the preferred network equipment vendor

As part of the continuous process of review of standards, the above examples may change. In additional standards for telephony may emerge.

If SWSLHD has defined vendor or equipment standards, they will be used to define the equipment to be purchased for the Campbelltown Hospital Redevelopment. Where there is no need to prescribe specific models of equipment, functional / performance based specifications will be used.

In the early part of the delivery of this redevelopment, the SWSLHD ICT team should review and define vendors and equipment standards. Where a standard has not been defined by then, SWSLHD will develop its own combination of prescriptive and functional specifications.

9.4 Business Continuity

Business Continuity is the concept of ensuring the facility can remain in operation in the event of equipment or service failures. This is achieved by design, redundancy of equipment and alternative methods to provide a service.

A Business Continuity plan must be developed with both the facility and the ICT team. It will often also require input from eHealth.

To create Business Continuity plans, several steps must be taken;

- Identify the services provided by ICT
- The facility & ICT team together should rate the availability required of each identified service
 - Hours of the day of normal availability
 - Agreed scheduled downtime
 - Targeted maximum unscheduled downtime
 - Define Recovery Time Objective (RTO) ie: the time to recover.
 - Define Recovery Point Objective (RPO) ie: the state it will be recovered to.
 - Identify downtime procedures
 - Indicate effectiveness of those downtime procedures

- Indicate the length of time the facility can operate using those down time procedures
- Consider the feasibility and cost effectiveness of making the ICT service more available through redundancy and other design consideration
- Build more highly available ICT service, or ones that can be recovered from more quickly, based on feasibility

There are many ICT systems and equipment that redundancy and resilience is a standard part of design. Data network and telephone system are 2 examples. Some of the following sections address those fundamental redundancy practices explicitly and implicitly.

9.5 Hybrid Communication Rooms and Computer Room

The redevelopment introduces a new computer room as well as new communications rooms (Campus Distributor (CD), Building Distributors (BD) and Floor Distributors (FD). (For an explanation of each communication room type, refer to the NSW Health cabling standard and the NSW Health Network Campus Design Guidelines.)

The traditional approach is to have each room as a physically separate room. However, by combining some rooms, the campus will benefit.

The benefits this approach gives includes;

- Higher availability of networks and services via redundancy. The hybrid CDs can become redundant copies, allowing for critical equipment and services to be built into those rooms so that, should either CD be lost, the other can take over the load.
- Over time, demand for space will change. A single room, rather than multiple physically separate rooms gives more flexibility.
- Removal of walls releases space and reduces the constraint a wall puts on the placement of equipment in a room

The diagram below shows this concept. It is indicative only.

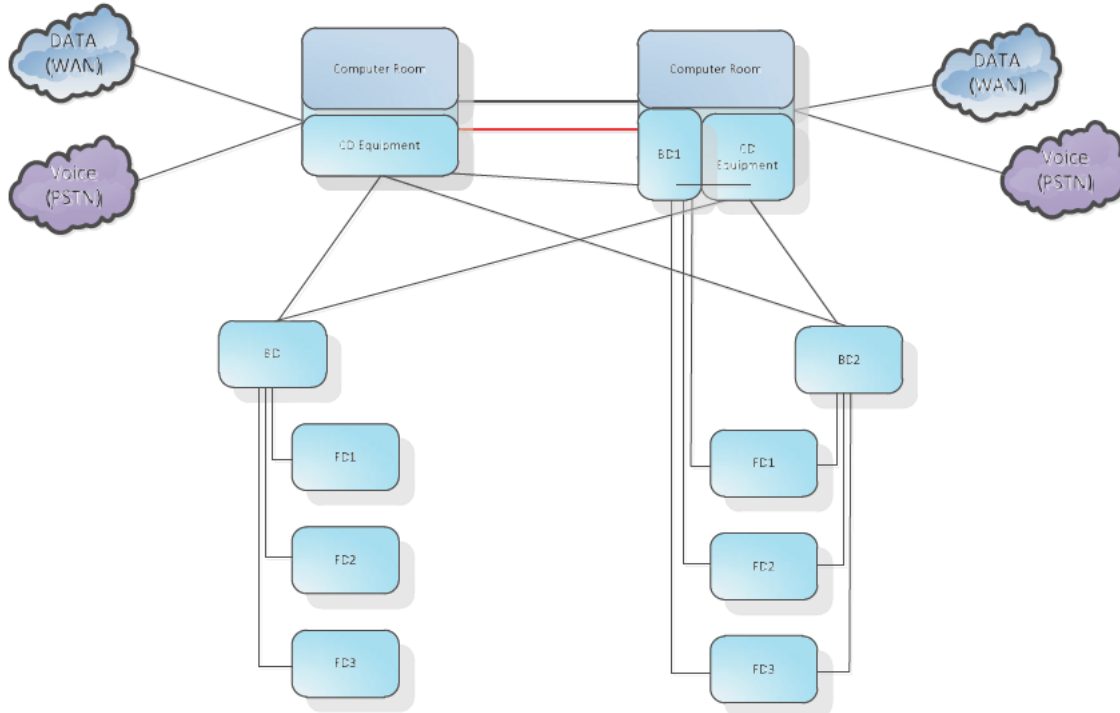


Figure 7.5 Hybrid use of Communications & Server Rooms

9.6 Networking

This section addresses networking, including cabling, switching and Communications rooms. It should be read knowing of the “Hybrid Communications and Server Room” approach described above.

9.6.1 Redundant Campus Distributors

The new building will include a main communications room that will be; a redundant Campus Distributor (CD), a Building Distributor (BD) for the new building and a Floor Distributor (FD) for the ground floor.

The dual CDs will allow redundant equipment to be installed in each, thus providing a highly redundant solution for the facility. Systems and equipment that are to be fully redundant across the CDs include;

- Telephone system
- WAN connectivity
- Data Network core infrastructure (both wired and wireless)
- Real Time Location Services (RTLS)
- Messaging
- Mobile Duress

9.6.2 Co-location of a BD & an FD

Co-location of a FD within a BD is also commonly done to achieve efficiency of space.

9.7 Structured Cabling

The NSW Cabling standard is the guide for all ICT cabling in the facility except for WiFi. Wireless Access Point (WiFi) cabling is described in NSW Health WiFi standard.

The LHD cabling standard will be used to supplement the NSW Health State standard. Where there is a conflict or ambiguity, the Electrical Consultant must seek agreement and clarification from the LHD ICT Telecommunications Manager.

9.7.1 Structured Cabling redundancy

Campus Distributors (CDs) will have redundant Single Mode Optical Fibre (SMOF) connections to each Building Distributor (BD) and each BD will have redundant SMOF to each Floor Distributor (FD). This will allow for the continued operation of services that use SMOF should any one CD or BD become unusable – of course that is dependent on those services to make use of the redundant SMOF.

There will be no cabling redundancy from Technical Outlets (TOs) to Floor Distributors.

Copper cabling (eg: Cat 6A and Cat 3) will not be redundant. Instead only one path for copper cabling will exist between a CD, BD and a FD. Services that require the use of copper cabling will have to find other means to achieve redundancy or will have to forego redundancy.

9.7.2 Shared use of Structured Cabling by Builder's systems

The builder and his subcontractors are discouraged from installing proprietary cabling and encouraged to make use of structured cabling where ever possible and where it can be done economically.

Nurse Call, BMS, Security, CCTV and other building specific systems all require some form of network to operate. Each network will require physical cabling, and some will be IP based.

During the life of the building, these systems are likely to be replaced several times. If those systems make use of the building's structured cabling where ever possible, that cabling has a high chance of reuse when the system is replaced. Proprietary cabling is unlikely to be reusable.

It is advised that that all builder supplied systems (ie: Group 1) that have any form of connectivity over cabling, should make use of the building's structured cabling and not proprietary cabling. Further, where those systems are IP based, the LHD ICT team should be consulted about the practicality of placing those devices and systems on the health facility's Local Area Network (LAN) rather than to construct another LAN.

9.7.3 Cabling for the Patient Entertainment System

Patient Entertainment Systems (PES) may be either analogue or IP based. The table below shows those alternatives and the options for cabling.

There is uncertainty about what the PES will be by the time Campbelltown redevelopment is completed. On that basis, Option 2 below is suggested, provided that it can be achieved economically and within the project's budget.

Option	The System that will deliver free to air TV to the patient	Cabling Type	Costs relative to a simple coax based MATV system	Future
1	MATV	Coax	Same	Will not work with an IP based Patient Entertainment System
2	MATV	Coax and run CAT6A cabling to the same points for future use	Extra cost of running 2 types of cable	Coax can be abandoned and Cat6A used if/when an IP based Patient Entertainment System is required
3	MATV	Cat6A (no coax)	Saving: don't have to pay for Coax Extra cost: Requires an adaptor per TV to convert the Cat6A outlet to a Coax plug (about [REDACTED] each)	Cable can be used for an IP based PES
4	IP Based (ie: it's an interactive experience for the patient, not unidirectional like a conventional TV)	Cat6A	Significantly more expensive because each Patient device has to be an intelligent device ie: a PC	Can deliver free to air plus other services to the patients' bedside.

9.7.4 Cabling to Wireless Access Points (WAP)

NSW Health's WiFi standard is to be followed for this redevelopment. Some of the principles from that standard are described below.

Each WAP location is to have dual data cables

To determine the likely location of Wireless Access Points (WAPs), a predictive survey will be conducted once floor plans are finalised and wall type construction material are finalised.

That predictive survey will inform the electrical subcontractor where to run cabling for WAPs. However, these predictive surveys are not 100% accurate with final accuracy only being able to be determined once the building is ready for occupation.

The standard approach is to run one cable to each WAP. Those cables should have a minimum 5m excess to allow for relocation of the WAP if required.

Where the ceiling is made of movable ceiling tiles, a fixed data outlet / Technical Outlet should not be fixed. Instead it should be movable to allow for the WAP to be relocated if required. For fixed ceilings, a fixed point data outlet is acceptable, but it should be noted that in extreme cases it may need to be relocated to tune the WiFi network.

An allowance of approximately 2-4% of spare cables should be made. The locations of the spares is to be determined by the WiFi network designer. Their location will be noted on the predictive survey plans.

9.7.5 WAPs in high risk areas

It is recognised that it is not optimal to install conventional WAPs in some locations such as in mental health rooms. However, it will often be unacceptable to compromise the WiFi network design by removing all WAPs from such high risk rooms.

WAP manufacturers and 3rd parties make external WAP antenna. In a mental health unit, where there is a fixed ceiling in a bedroom, the external antenna can be mounted in a way that is unlikely to be tampered with by a patient. The WAP (which does not have inbuilt antennae), is mounted in a ceiling space where it can be accessed; typically above a manhole in a corridor. Antenna cable then runs from the WAP to the external antenna. An example is shown below.



External Antenna in a Mental Health Unit bedroom.

Where a high risk room must have a WAP, solutions such as external antennae is to be discussed with the LHD ICT team.

9.7.6 Fixed ceilings

Fixed ceiling make placement of Wireless Access Points (WAPs) more difficult. The main difficulty is that WAPs often need to be added or moved after conducting the wireless network survey. The wireless network survey is conducted around the time of the builder's handover.

In areas where fixed ceilings are essential, man holes in corridors will be required to allow ICT support to gain access to the WAPs over the life of the building.

9.7.7 Structured Cabling Pathways

Pathways used for structured cabling should coincide with service areas and corridors, avoiding traversal through sensitive clinical areas. This is to avoid interruption to those sensitive clinical areas if, in the future, additional cabling is required.

9.8 Telecommunication Services

The telecommunication services delivered to the site are greatly influenced by NSW Health HWAN project and LHD standard practices and contracts.

9.8.1 Redundant Telecommunication Services and Lead-Ins

A contemporary hospital relies on telecommunications to provide clinical and corporate services to the campus. These services are increasingly being hosted off campus and thus telecommunications are essential. Consequently, it is good practice for healthcare facilities that provide critical services to have redundant telecommunication services.

To facilitate physical diversity of the redundant telecommunication services, physically diverse paths from telco exchange to Campus distributors is required. Key segments of those paths are;

Path Segment	To achieve physical diversity and remove a single point of failure
From telco exchange to lead-in pit in the street	Neither of the 2 redundant telecommunication services should travel the same path. Sometimes this is achieved by one service being terrestrial and the other being wireless
From the lead-in pit in the street to the Campus Distributor	Where both services are terrestrial, different lead-in pits should be used and the paths from the lead-ins to the CDs should be physically diverse.

The LHD will determine what telecommunication services will be used on site. If 2 are used, it will allow the concept shown in section *“Hybrid Communication Rooms and Computer Room”*.

9.8.2 Voice telecommunication services

Voice telecommunication services are expected to be delivered via redundant, physically diverse links. This may be the same links are data services if the LHD ICT team uses SIP trunk services.

Those services should be delivered to both CDs so that in the event of a catastrophic failure of a CD, the remaining CD will be able to take much of the telephony load of the facility.

9.8.3 Facsimile telecommunication services

The facility is encouraged to remove the need for facsimile machines where ever possible. Where that is not possible for a specific process, replace physical fax machines with fax gateway server(s). Facsimile lines may be provided by an analogue gateway off the telephone system.

9.8.4 Data telecommunication services

Data telecommunication services are defined by the HWAN project. As described above, dual, redundant, physically diverse data telecommunication services are expected for this facility.

9.8.5 Disaster Phones

It has been common practice in the past to use analogue voice services, typically PSTN over copper, for a facility to use in the event of a PABX / telephone system failure. The introduction of NBN has changed the viability of this approach.

A detailed Business Continuity plan must be created which will include communications intra & inter campus in the event of a catastrophic failure of the facilities telephone system.

9.9 Data Network

The Data Network will be designed in accordance with the NSW Health LAN Campus design blueprint.

9.9.1 Collapsed Network

The Core and Distribution layers will be collapsed into a single physical infrastructure. The Access layer will remain physically separate.

9.9.2 Data Network Redundancy

As described in the section above *“Redundant Campus Distributor and Building Distributor Rooms”*, the data network will be redundant across the CDs. This is true of both the wired and wireless Local Area Networks (LANs).

9.9.3 Wireless Network Coverage and Performance (WiFi)

The WiFi network will be designed in accordance with the NSW Health WiFi standard. In summary this will mean;

- A suitably experienced and accredited person will design the WiFi network’s WAP placement
- The network will support RTLS to room level accuracy, or better
- All services will be available on both 2.4Ghz & 5Ghz frequencies
- Devices will connect to the 5Ghz frequency if they are capable to do so
- Coverage of WiFi is to be determined and as a guide it will be; all internal areas, only those external areas that are used by staff when carrying out their normal day to day duties.

9.9.4 Guest WiFi

eHealth is currently trialling a Guest WiFi solution that allows patients and other visitors to access the WiFi network and the internet. That system is expected to be implemented on the Campbelltown campus in the future. It is expected to be self-funded.

The wireless network being built in the Campbelltown redevelopment will support the solution.

9.9.5 Remote access

Vendors will often require remote access (via internet) to commission and support systems such as Nurse Call, BMS, Security and Major Medical Equipment. This access may not be possible before the new data network is commissioned.

9.10 Networking of Group 1 ICT Systems

There are a number of ICT systems that are Group 1 and of which their networking requirements must be considered. Those systems include;

- Nurse Call,
- BMS,
- Security (access control)
- CCTV,
- Thermo Mixing Values (TMV),
- Electronic way finding

Consultation with the LHD ICT must occur before specifying the above systems.

It is preferred, that where practical, these systems;

- Make use of the building's structure data cabling rather than proprietary cabling
- Make use of the facility's data network (LAN). They may be one their own VLANs.
- Are implemented following good practice ICT system management principles that comply with LHD standards

Each of these points is discussed below.

9.10.1 Use of the building's structure data cabling rather than proprietary cabling

Vendors of Group 1 systems that require any form of network cabling should use the building's structure cabling where ever that is practical and cost effective. This allows for the best chance of reuse of that cabling if and when that Group 1 system is replaced in the future.

9.10.2 Use of the facility's data network (LAN)

The LHD has a preference to Group 1 systems making use of the facility's LAN rather than building bespoke LANs for each Group 1 system.

This may take the form of a system that is wholly and solely part of the facility's LAN. Examples are TMVs and CCTV. Alternatively it could take the form of a system that is a hybrid tha is partially a proprietary network and partially on a facility's LAN. Examples include BMS and Nurse Call.

9.10.3 Good practice ICT system management principles that comply with LHD standards

These Group 1 systems are often complex ICT systems and require good practice operational management principles to be applied for their specification and ongoing support and maintenance.

This includes;

- Operating System patching and maintenance
- Security
- Antivirus
- Backups
- Redundancy
- Hosting; physical and/or virtual
- Application Support

- Change Management (ie: ITIL)

Consultation with the LHD ICT must occur to articulate the above requirements before specifying these Group 1 systems.

9.11 Telephony

The SWSLHD stand for telephony is based on Cisco VoIP systems. A new Cisco Call Manager telephone system will be introduced to the Campbelltown campus.

As described in the section above “Redundant Campus Distributor and Building Distributor Rooms”, the telephone system will have a redundant infrastructure that will be housed in each CD. This will allow for either CD to become unavailable for any reason, and still telephone service will be available across the campus via the second CD. The exception to this will be analogue telephone services, which will not be redundant between CDs.

9.11.1 Staff Handsets - wired

Staff phones will be VoIP based. The handsets will be of a contemporary standard including such features as; Hands free / speaker & microphone, Line appearances and Soft keys.

PCs will connect via the phone where both a phone and PC are on the same desk. The phone’s switch will be 1Gb/s.

9.11.2 Staff Handsets - wireless

Wireless phones will be WiFi based. The handset will be of a standard that allows hands free and other advanced telephony functions including message delivery. The phones are to be of a standard that will tolerate the rigours of a health environment including cleaning and battery life/replacement batteries.

9.11.3 Teleconference Handsets

Because of the high quality of the standard staff handsets, specialised teleconference phones will only be required in large meeting rooms.

The facility is to determine whether the handsets are permanently allocated to each room, or lent out when the room is to be used for a teleconference. The former is the recommended approach.

9.11.4 Voice Mail

Voice mail will only be provided to extensions agreed with the facility. Typically extensions that are not allocated to a specific person will not have voice mail.

There may be a need for a “common” voice mail box for some staff eg: Community Health.

Whether voice mail will be made redundant across CDs will be a matter of practicality and cost – but it is not an imperative.

9.11.5 Patients' use of mobile phones

Patients will be encouraged to use their own mobile phones.

NSW Health has removed many of the restrictions about the use of mobile phones in a health facility. Current guidelines warn that mobile phones should not be used with 1 metre of some medical equipment.

- The facility will need to create guidelines for patients using their mobile telephones in the facility. Those guidelines will include;
- Any areas where mobile phones should not be used due to interference with medical equipment
- Etiquette in wards with regards to loudness of ring tones, loudness of the telephone conversation, and times of day to avoid making or receiving calls.
- Privacy issues, especially regarding taking photographs
- Not to enable WiFi hotspots on smart phones as it will interfere with the hospital's WiFi network.

9.11.6 Patient telephones by the bed

Although many patients will use their own mobile phone, standard practice will be to provide a wired phone next to each patient bed. This caters for those patients who do not have a mobile phone. This is more common amongst the elderly, who are also more likely to be patients. The cost of providing patient phones by the bed side is small compared to the extra overhead of nursing staff having to take portable phones to a patient who has no mobile phone.

9.12 Mobile Phone Coverage – Distributed Antenna System (DAS)

It is generally agreed that mobile telephone and data coverage is required in a modern health facility. Similarly, mobile phone coverage is required in the Campbelltown redevelopment buildings. It is anticipated that in the multi-storey building, a DAS will be required to provide adequate signal. However in smaller buildings on campus signal from the macro phone towers in the town is expected to be sufficient.

There is a well established NSW Health process for engagement with mobile phone telcos.

9.13 PCs, Printers, MFDs

The type of PC, Printer, Multi-Function Devices (MFD) and similar equipment will be based on LHD standards.

The quantity required will consist of:

Devices	Funding Source	Comment
Existing devices that will be transferred to the new facility	No cost other than cost of relocation	

New devices that replace existing devices that are judged to be too old to relocate.	At the cost of the LHD as part of normal RMR budget	These devices should be installed into the new facility in such a way as to allow commissioning of the new facility and also to allow the new facility to operate while the “transfer” equipment is in transit
Additional devices that are required due to increased services in the new facility eg: additional beds	At the cost of the project	These devices should be installed into the new facility in such a way as to allow the new facility to operate while the “transfer” equipment is in transit

9.13.1 Point of Care Computing

There are different means to provide point of care computing, for example;

- Conventional desktop PC at a staff station
- Conventional desktop PC by the bedside, usually on a wall mounted arm
- Workstation on Wheels (WOW)
- Tablet device
- Hand held device
- Laptop

A clinical group must be tasked with the role to determine which device type is appropriate in what circumstances. That guidance can then be provided to each unit manager to assist them to determine the specific requirements for their unit.

9.13.2 PCs, Printers and WOW location

PCs need either desk to sit on or a wall mounted arm. Common locations for wall mounted arms are; by the bed side, ED bays, ICU bed bays, theatres, and anaesthetic bays. Provision should be made for wall mounts on the clinical side of every bed by allowing sufficient noggings or similar in the wall to mount the arm.

Printers can be desk mounted or floor standing.

Workstation On Wheels (WOWS) require a location to be parked when not in use. That should include a power outlet. Provision of power will give flexibility for future devices. Data outlets are not required in the parking area.

The current model of WOWs requires 1 charging bank per 2 WOWs. Charging banks are approximately 300mm x 180mm x 200mm.

9.13.3 Audit of Existing Equipment

An audit of existing equipment will be required so that;

- Equipment that is approaching replacement age can have the replacement synchronised with the commissioning of the new building, thus avoiding transfer costs and allowing the new building to be partially populated with new equipment before the date of decanting
- Equipment to be transferred can be identified in its current location and its transfer location can also be planned for
- Quantities of additional equipment required for the new building can be determined along with their locations

9.14 Video Conferencing & TeleHealth

The type of Video Conferencing and TeleHealth equipment required will be based on LHD standards. The quantity required will consist of:

Devices	Funding Source	Comment
Existing devices that will be transferred to the new facility	No cost other than cost of relocation	
New devices that replace existing devices that are judges too old to relocate.	At the cost of the LHD as part of normal RMR budget	These devices should be installed into the new facility in such a way as to allow the new facility to operate while the “transfer” equipment is in transit
Additional devices that are required due to increased services in the new facility eg: additional beds	At the cost of the project	These devices should be installed into the new facility in such a way as to allow the new facility to operate while the “transfer” equipment is in transit

A highly detailed plan is required to document and detail the above.

9.14.1 Over bed Diagnostic Cameras

Over bed diagnostic cameras are expected to be required in the 2 resuscitation bays in ED. An existing over bed camera will be transferred to one bay and the other bay’s camera will be purchased new.

9.14.2 Meeting Room Video Conference

2 meeting rooms are expected to be fitted with video conference equipment suitable for meetings.

9.15 Applications – Configuration for the new Facility

The applications used in the facility are to be identified. A process will then be followed to;

- Identify the applications that will need to be reconfigured to suit the new facility for example, due to new facility code or new room names
- Identify who will do that work
- Schedule the work to be done
- Do the work and test that it has been done correctly

9.16 Computer Room Relocation

The existing facilities have a modest amount of servers and related equipment. The effort to relocate any of those servers into the new CD will be dealt with by the LHD ICT team with no budget required of the redevelopment.

9.17 Major Medical Equipment

Some medical equipment will require access to the data network and possibly other ICT services.

The requirement can vary widely depending on the particular equipment.

All medical equipment that will / might make use of ICT services need to be identified, and the ICT requirements described. The risk is that if medical equipment is procured without the knowledge of the ICT team, significant problems and cost can be incurred when the equipment is being commissioned.

A list of medical equipment that has the potential to connect to the ICT network must be developed.

This list must come from existing equipment plus planned purchases. To achieve the latter, ICT signoff on CAR forms is required for any equipment that might be connected to the data network or that requires any software to be installed or that requires internet access.

Each item on that list should be reviewed to determine the ICT requirements and then appropriate plans developed for each.

9.18 Messaging and Duress

Messaging and Duress are described together due to the tight co-dependence.

9.18.1 Future Duress Aspiration

The Campbelltown facility wishes to achieve the following;

- Have one mobile duress solution across the campus. It will be based on WiFi infrastructure.
- To have the fixed and mobile duress systems operate together so that operationally, the systems act as one. This will be achieved by the introduction of a Message Integration Engine (MIE) and the integration of the fixed & mobile duress solutions into that MIE

The generic requirement is for Duress is defined in NSW Health policy “Protecting People and Property”. Fixed duress is a Group 1 item. The location of fixed duress points are defined outside of this plan. Mobile duress is a Group 3 item and is defined and implemented by this plan. While Fixed and Mobile duress are provisioned by different parties, both must activate the same response processes. For that to occur, the response team must receive notification of the duress events. The Message Integration Engine is the means to inform the response team, regardless of whether it is fixed or mobile duress trigger.

The diagram below shows this concept.

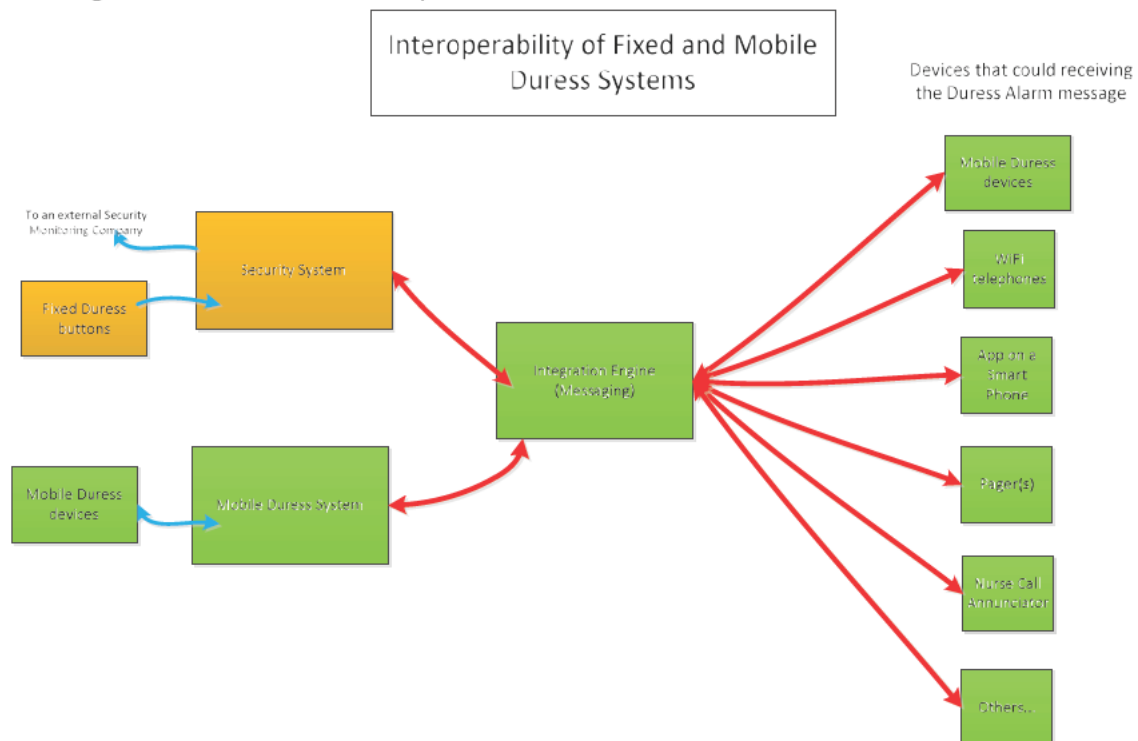


Figure: Interoperability of Fixed and Mobile Duress Systems

9.18.2 Achieving the Future Duress Aspiration

Achieving the Future Duress Aspiration includes elements that outside of the scope of the Campbelltown redevelopment redevelopment. However that redevelopment provides the opportunity. The following table shows the major elements of the solution and assigns responsibilities for each.

Element	Location	Responsibility and Funding Source	Comment
WiFi infrastructure	Within Campbelltown redevelopment buildings	The redevelopment project	
	Other buildings on campus	Campbelltown and the LHD	This may need to be extended to cover all buildings
Fixed Duress buttons and systems	Within Campbelltown redevelopment buildings	The redevelopment project	
	Other buildings on campus	Campbelltown and the LHD	These are already in place
Mobile Duress Devices	Within Campbelltown redevelopment buildings	The redevelopment project	
	Other buildings on campus	Campbelltown and the LHD	This will replace all existing mobile duress devices
Message Integration Engine and RTLS	Within Campbelltown redevelopment buildings	Pro rata to the redevelopment project	
	Other buildings on campus	Pro rata to CAMPBELLTOWN/ LHD	

9.18.3 The Messaging Concept

Messaging offers the potential benefit of improved communications in a facility, especially from systems that automatically generate messages. The functional concept of messaging is shown below.

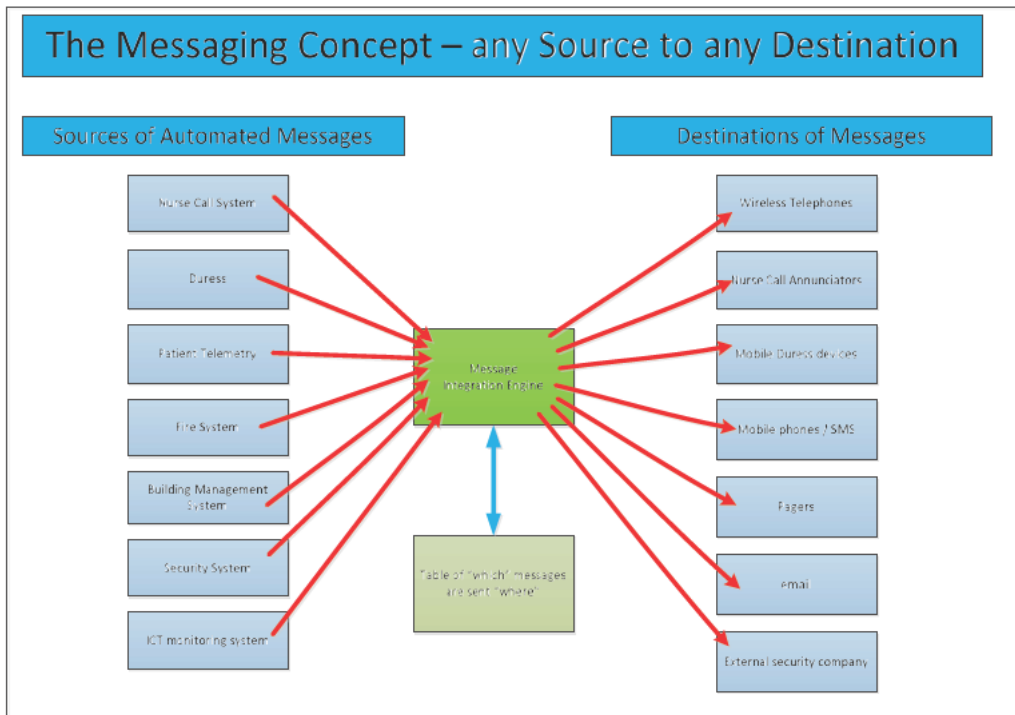


Figure 9-1 The Messaging Concept

9.19 Patient Entertainment System

Patient Entertainment Systems (PES) are undergoing a paradigm shift. In the past, a 3rd party organisation has provided “Free to Air TV” to the patients’ bedside. This has been funded by the 3rd party and the patient has typically paid a daily fee. The revenue was shared between the 3rd party and the hospital. This business model is failing due to competition from the internet and the growing dissatisfaction of patients with paying for “free to air TV”.

The contemporary PES options include;

Option	Device by the Bedside	Functionality	Funding	Typical Capital Cost per bed	Comment
3rd Party Funded	A TV with remote control integration to the Nurse Call pendent	Free to Air content, plus option streaming content form the facility	[REDACTED]	N/A	This business model appears to be not sustainable as internet and other demands make it untenable
Redev. funded MATV, Community Funded TVs	A TV with remote control integration to the Nurse Call pendent	Free to Air content, plus option streaming content form the facility	[REDACTED]	[REDACTED]	This has been successfully done in several rural healthcare facilities
Redev. funded MATV and LHD Funded TVs	A TV with remote control integration to the Nurse Call pendent	Free to Air content, plus option streaming content form the facility	[REDACTED]	[REDACTED]	This is only possible when LHD funding permits.
Proprietary Integrated PES	A proprietary, integrated, IP based system	Free to Air content, plus option streaming content form the facility, internet browsing, menu ordering, surveys, patient telephone	[REDACTED]	[REDACTED]	Recurrent cots will also be high. Much of the functionality provided by this solution is now available by non-proprietary

					solutions. See next row
Non-Proprietary Hybrid	The amalgamation of several solutions to deliver similar functionality to proprietary solutions	Free to Air (via MATV), Internet access including portals surveys menus (via Guest WiFi), patient telephone (via a conventional phone or mobile phone).	Funding for MATV as above. Other systems are funded via existing LHD initiatives.	As for MATV above	This solution may not provide as tight integration as the proprietary solution, but it can provide similar functionality for far less cost.

The correct solution for PES is to be determined in detailed design. This has been added to “Potential Innovations”, although funding is not confirmed.

9.20 3RD Party Organisations that are On Site

No 3rd party organisations have been identified that will be impacted by the ICT services provided in this plan.

9.21 Data Network and Communication Systems Implementation before Construction Handover

ICT equipment must be installed before construction handover to avoid a delay in occupying the facility. This causes a potential conflict between the builder and the ICT team. To allow the ICT team to carry out their work while the facility is still in the builder’s possession, the following conditions must be met.

Construction up to and including Communication Rooms

Communications rooms (Campus Distributors, Building Distributors and Floor Distributors) must be complete. This means they are clean, dust free, lockable with restricted access and have constant A/C and power supply. The builder’s subcontractors (Nurse Call, BMS, Security, etc) and the ICT network implementers will have joint access to the communication rooms for installation of equipment.

In addition, ceilings, walls, doors and all major structures must be in place to allow for the installation of Wireless Access Points and for wireless surveys to be undertaken. While it is expected that an additional wireless survey will be required after occupation, this initial survey will be for WiFi phones only. This means it is imperative that there is no significant construction work underway after handover of the communication rooms that could change the RF pattern of the building. The secondary RTLS survey must be completed after FF&E is installed due to the experience at another health facility where the survey had to be deleted because it was inaccurate.

Build, test and commission Message Integration

Prerequisite to the commencement of this work, all core data network must be in place, as well as core Nurse Call, BMS, Security and any other system that requires message integration. The Message Integration work will include ICT implementers working with the builder's subcontractors.

9.22 Building Naming, Room Naming & Way Finding

They are many users of room and building names. For example: Nurse Call, BMS, Security, Fire, Way Finding Signs and Duress Alarms.

Consistency of naming is paramount. Without it safety could be compromised if a nurse call medical emergency, security or duress event generates an automated message that makes it difficult for the responders to find the location.

It is recommended that this issue is addressed when specifying Nurse Call, BMS etc to ensure those systems can cater for the length of room names required. In the case of Nurse Call, for example, it is not always desirable to display the full name on every annunciator, yet it is important to supply the full name when sending Medical Alarm messages to the Raid Response / MET Call team. This implies the Nurse Call system has some flexibility. This is a key point in a large facility and the Nurse Call system must be specified to deal with this.

Appendix A shows an example of how this information can be collected, and how each system uses room names. A spread sheet is also available.

This work needs to be completed by:

- Agreeing on Building Names and abbreviations
- Agreeing on floor names and abbreviations
- Agreeing on department / units within floors and their abbreviations
- Agreeing on generic names for rooms eg: Dirty Utility
- Gathering the constraints on name lengths each system may have
- Creating Way find and door signage plans
- Consistently applying names and abbreviations across all systems, and maintaining that in a master spread sheet
- • Providing the exact text to be use by all parties, and having a process that allows for changes to be communicated to all parties.

9.23 Sequencing of Commissioning

Due to the many parties and systems with interdependencies, commissioning those systems becomes a complex task.

There are both physical interdependencies, and system interdependencies. Physical interdependencies include such things as access to a fully operational communication room before building handover so that the ICT data network team and install the data network. System interdependencies include such things as the builder's CCTV subcontractor needing access to the data network in order to commission the CCTV system. This is a symbiotic relationship. Coordination of all parties' activities is paramount.

The diagram below shows a high level view of the scheduling of ICT systems and equipment relative to the builder.

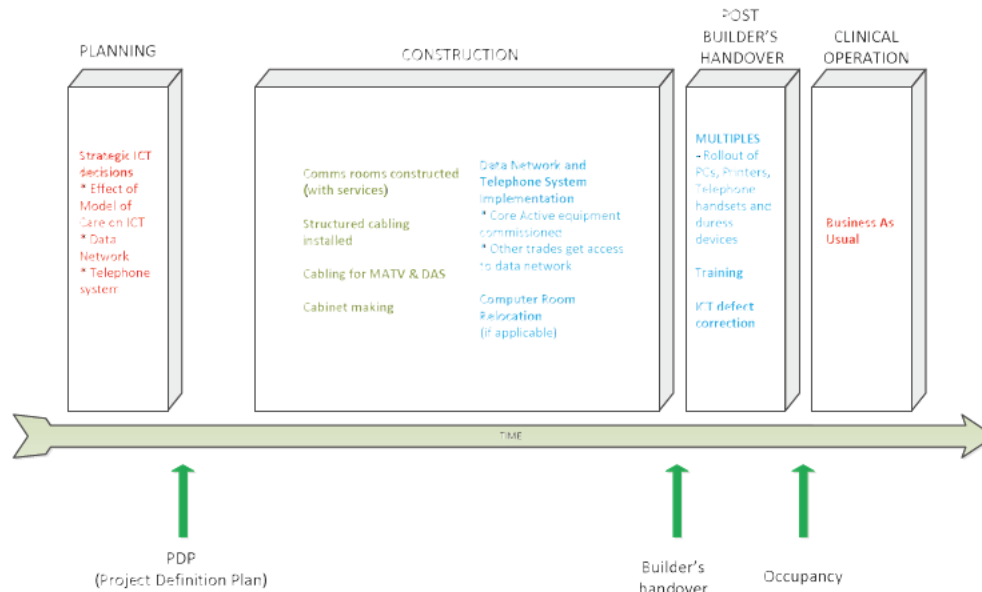


Figure 9-2 Scheduling of ICT systems and equipment relative to the builder

General Considerations for the Coordination of activities between the ICT Network & Telephone Team and the Builder & the Builder's subcontractors

WHO	NEED	DEPENDENCY
Builder	To connect Nurse Call, BMS, Security and CCTV systems to an operational data network	The data network must be already built by the ICT team
Builder	Telephone lines in lifts, at fire panels etc	The telephone system has to be built and operation by the ICT team
ICT Team	Install the data network equipment in comms rooms	All data cabling must be completed & the comms room must be finished; clean, secure, A/C, UPS
ICT Team	Install the WiFi network	The builder must have run all cable to WiFi points and physically attached WAPs to ceilings
ICT Team	Commission the Mobile Duress System and Wireless network	All builder activity that could change wireless signal must be complete before the surveys commence. This includes all doors are hung, Windows & film on them is in place, no changes to walls, all plant & equipment to be in place.
Builder & ICT Team	Commission & Test message integration between Nurse	Nurse Call, BMS, Security etc need to be fully operational.

	call, BMS, security etc to telephones, pagers etc	Data network needs to be fully operational.
--	---	---

Table 9-1 Coordination of Activities between ICT Team and the Builder

For the purposes of this illustration, consider that ICT equipment and systems consist of 2 components; the core infrastructure and the equipment deployed at the work space. The former includes the core network equipment, PABX and Message Integration for example. The latter includes PCs, Printers, telephone handsets, network distribution switches and Wireless Access Points.

To fully commission a new or refurbished building, there are Group 1, 2 and 3 items that need to be coordinated. The diagram below shows a high level time line and the interdependencies between builder’s activity and ICT activity for a new building.

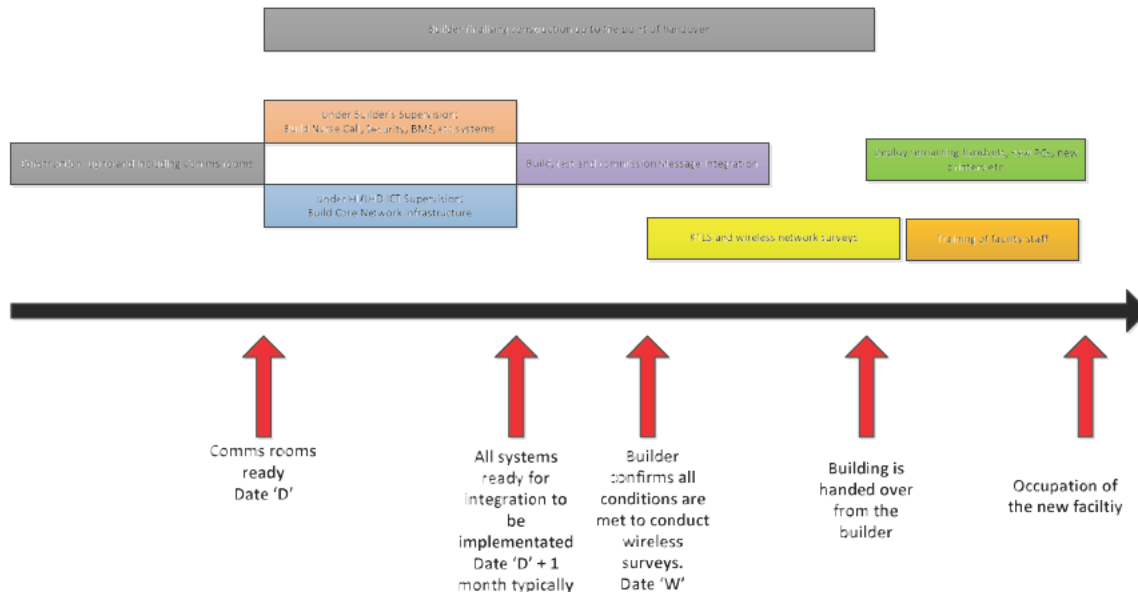


Figure 9-3 Flowchart showing interdependencies between builder’s activity and ICT activity

“Comms rooms ready Date ‘D’

Communications rooms (Campus Distributors, Building Distributors and Floor Distributors) must be complete. This means they are clean, dust free, lockable with restricted access and have constant A/C and power supply. The builder’s subcontractors (Nurse Call, BMS, Security, etc) and the ICT network implementers will have joint access to the communication rooms for installation of equipment.

“All systems ready for integration to be implemented Date ‘D’ + 2 months typically”

After the base network infrastructure is built, the builder’s subcontractors can have access to the network. They need network access for; connection of head end equipment, connection of devices eg: CCTV cameras, and for remote access. As each of the builder’s subcontractors (BMS, Security, Access Control, Nurse Call, Fire etc) makes their system ready, work can then begin to integrate the system into the Message Integration Engine.

“Builder confirms all conditions are met to conduct wireless surveys. Date W”

RTLS and Wireless Network Surveys

(The actual WAPs are installed before this time, usually as a Group 2 item.)

These surveys measure the RF signal of the WiFi network so that the facility is mapped and the location of a duress event can be calculated by the WiFi network. Accuracy is paramount. To conduct these surveys, ceilings, walls, doors and all major structures must be in place. Changes will affect accuracy, and surveys may need to be discarded and restarted if there is significant change. The builder must have completed all works that installs doors, walls, screens, film on glass, significant metal structures, or any other element in the building that can affect the RF signal of WiFi.

RTLS surveys cannot commence until the builder has complete all of those works. RTLS surveys take up to 4 weeks for a large building.

Deploying remaining handsets, new PCs, printers etc

This activity is normally done after builder's handover because before that time the building is often not secure, clean and often some cabinetry is not in place.

Training of Facility Staff

Staff training requires all systems are operational. This is especially true of Duress and Messaging as they often affect work practices that the facility needs to train staff in.

Build, test and commission Message Integration

Prerequisite to the commencement of this work, all core data network must be in place, as well as core Nurse Call, BMS, Security and any other system that requires message integration. The Message Integration work will include ICT implementers working with the builder's subcontractors.

10.0 ICT Design Principles and Guidelines – Operational

This section describes the ICT Design principles and guidelines to be used when executing this plan and creating the detailed design.

10.1 Service Levels Required

This plan recognises that no changes to agreed service levels between the facility and the LHD ICT team will be required.

10.2 Support Models

This plan recognises that no changes to support models for ICT systems and equipment will be required.

10.3 Personnel

This plan has not identified the need to increase LHD ICT staff to support the systems and equipment provided under this redevelopment.

10.4 RMR Budget

The budget shown in Appendix A shows the estimated recurrent budget required for each system implemented by this plan. It does not identify the existing recurrent costs which must be used to determine the change in recurrent funding required.

11.0 Cost Plan

The cost plan is divided into the 5 foundations are described throughout this document. The table below summarises the cost plan and the sections below provide commentary on each.

Cost Plan Line Item	Allowance
Clinical and Corporate Systems – existing & planned	
Clinical and Corporate Systems – potential new	included in “Potential Innovation”
ICT Infrastructure – New & refurbished buildings	
ICT Infrastructure – Whole of campus	
Potential Innovation	

Table 11.0 Cost Plan Summary

11.1 Allowances for Clinical and Corporate Systems

As described in *6.0 Clinical Systems & Corporate Systems* this strategy considers existing and planned clinical and corporate systems.

11.1.1 Existing Clinical and Corporate Systems

No allowance is made in this cost plan for existing Clinical & Corporate systems as they are already in situ.

11.1.2 Planned Clinical and Corporate Systems

No allowance is made in this cost plan for planned Clinical & Corporate systems. The plans are expected to have already addressed funding. Also, funding for those systems is not the responsibility of the redevelopment.

11.1.3 Potential New Clinical and Corporate Systems

Allowances for potential new clinical and corporate systems described in *6.3 Potentially New Clinical & Corporate Systems for consideration* have been included in the Cost Plan section *11.2 Potential Innovations Allowance*. This is because many of these systems are intertwined and are therefore inseparable.

11.1 Allowances for ICT Infrastructure

The scope described in Section 7.0 ICT Infrastructure is divided into 2 areas; new & refurbished buildings and whole of campus. The cost plan details for each are described below.

11.1.1 New and refurbished buildings Allowance

The scope described in Section 7.1 *ICT Infrastructure Scope – New and refurbished buildings* will make use of budget allowances based on standard project rates. This is because until detailed design is completed, actual quantities are unknown.

11.1.1 Whole of Campus Allowance

The scope described in Section 7.2 *Whole of Campus ICT Infrastructure* will require an investment in excess of standard redevelopment allowances.

	Existing Buildings	Extra required to achieve campus wide that is not in redev scope	Estimated additional funding required
Mobile telephone coverage	Only building D has coverage	Buildings A, B	████████
WiFi (Wireless network)	All existing buildings have lower than RTLS grade	All existing areas will require WiFi redesign including additional APs, cabling network ports & patching	████████
BLE			████████
Structured cabling (Horizontal)	TBD	Extra cabling required (cabling to APs included in above)	████████
Structured cabling (Vertical)	TBD	If MMOF is used, it will need to be replaced with SMOF	████████
Mobile Duress	Not using WiFi based mobile duress	Will need to be upgraded to Mobile duress using WiFi, RTLS and Messaging Engine	████████
Fixed Duress	TBD	TBD	████████
MET Calls (Medical Emergency) and other alerts via messaging	TBD Uses pagers?	Will require integration with the MIE and end devices	████████
Nurse Call	TBD	Will require integration with the MIE	████████







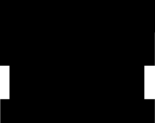



BMS	TBD	Will require integration with the MIE	[REDACTED]
Fire Indicator Panels (FIP)	TBD	Will require integration with the MIE	[REDACTED]
CCTV	TBD	TBD	[REDACTED]
Access Control	TBD	TBD	[REDACTED]
Public Address System	TBD	TBD	[REDACTED]
Electronic Wayfinding (BLE)	TBD	TBD	[REDACTED]

11.2 Potential Innovations Allowance

It is recommended an allowance is made for the redevelopment to explore the potential innovations described in this document. The funding principle is that the redevelopment will implement those innovations that are judged to have a high change of delivering significant benefit to the Campbelltown Health Service up to a maximum total amount that can be made available from redevelopment finding.

A total maximum allowance of \$2,000,000 is recommended.

Function	Priority	Comment	Estimated Cost
Outpatient Queue Management	High	Assumes LHD has the necessary base headend infrastructure in place, plus experience from deployment in other facilities in the LHD	[REDACTED]
Clinician to Clinician voice and data communications	High	Assumes maximum 50 staff on duty at any time, each having a smart phone/device	[REDACTED]
Patient Entertainment System and Point of Care Computing	High	This requires a significant analysis piece to determine actual requirements before feasibility can be considered.	[REDACTED]
Multi-Disciplinary Team meeting room; physical or virtual	High	Fitout of a physical meeting room is [REDACTED]. Cost of a virtual room with all end points is TBD.	[REDACTED]
My Food Choices	High		Low

Workflow management for selected use cases eg: MET calls, bed turn over, porter calls, critical results	High	Requires Clinician to Clinician communications is already done. Allowance for 2 workflows to be implemented.	
Patient Wandering	High	Leverages WiFi & RTLS	
Biomedical asset tracking	High	Requires campus wide RTLS	
Conversion of paper forms to eMR	TBD	This is the process of changing from paper forms to electronic forms	
Back scanning of medical records into the eMR	TBD	The scanning of paper records and then linking the scanned document in the eMR. This is occurring as BAU at the moment, and the initiative can accelerate that.	
Cerner 360 Content (Forward batch scanning)	TBD		
Mobile Telehealth video conferencing for diagnosis	TBD	The ability to take mobile video conference to the bed side for diagnosis or consultation	
Digital dashboards	TBD		
Electronic Wayfinding	Medium	Requires BLE so the first number if BLE is not already in place.	
Hand Hygiene compliance	Medium	Requires BLE so the first number if BLE is not already in place.	
Stock control	TBD	This is adapting stock control methods from the corporate world and applying them to a hospital environment.	
Neonate pairing with mother	TBD		
Ambulance – aged care transportation advisory service	TBD		
Bedside, on demand video conferencing			
Integration with BYO wearables to collect telemetry			

Critical Results Reporting	TBD	Study the StG solution	Study the StG solution
Monitoring patients in the home			
Car park booking & full wayfinding journey from home & return			
Scheduling theatres & online checkin			
Facsimile	TBD	Remove the use of facsimiles. Where that is not possible for a specific process, replace physical fax machines with fax gateway server(s).	■

12.0 Appendix A – Risk Log

The Project Schedule is to be developed, to reflect this plan, in the next stage.

RISK RANKING	RISK CATEGORY	RISK DESCRIPTION	MITIGATION STRATEGY
[Redacted content]			

13.0 Appendix B – Implications for Group 1

REF	ISSUE	GROUP 1 IMPLICATION
1	WiFi Design & Cabling	<p>The WiFi network should be designed for both 2.4Ghz & 5Ghz and perform to a standard suitable for VoIP, RTLS (to room level accuracy) and data.</p> <p>Coverage is required in all in door areas, generally, with plant room areas to be determined.</p> <p>Dual cables should be run to each Wireless Access Point (WAP).</p> <p>WAP cables should have an excess of 5-10m</p>

		<p>cable to allow for relocation.</p> <p>WAPs are required in lifts.</p> <p>WAPs are required in stairwells that are used by staff to move between floors.</p> <p>WAPs may not be required in stairwells that are only used for emergency egress.</p> <p>WAPs may be required in plant rooms, but may be to a lower coverage & performance specification.</p> <p>This is for negotiation with stakeholders.</p> <p>Outdoor coverage is limited to the following areas; ambulance bays, enclosed courtyards, main entry,</p>
--	--	---

		transit paths between buildings, areas where staff are required to move through as part of their normal day. This is for negotiation with stakeholders. A small number of external WAPs will be required.
2	Mobile duress and related infrastructure is a Group 3 item. Fixed duress is a Group 1 item.	
3	<p>Builder supplied systems such as Nurse Call, BMS, CCTV, Security (Access Control) should;</p> <ul style="list-style-type: none"> • Make use of the structured data cabling where ever practical 	Careful definition of roles and responsibilities must be made.

	<ul style="list-style-type: none"> • Be on the hospital's LAN where ever practical, although VLANs will be used. • Will comply with good operational practices such as anti-virus software, backup, redundancy, O/S patching 	
4	BLE infrastructure is required for Hand Hygiene and Wayfinding initiatives.	A BLE is beacon is a battery powered device. For the hand hygiene initiative, a BLE beacon will be fitted at each hand hygiene station as well as by every patient bed & bay. For the Wayfinding

		<p>initiative, BLE beacons will need to be fitted in all public walkways at approximately one per 10m of straight walkways plus one per corner/turn.</p>
5	<p>Group 1 systems will require the data network to be operational approx. 2 months before builder’s handover so that those systems can be commissioned.</p>	<p>The builder and his subcontractors must work with the LHD ICT team to schedule the completion of communications rooms at least 2 months before handover of the building. Also the builder’s subcontractors must coordinate the integration of systems with the LHD ICT team and their</p>

		<p>subcontractors. This includes; Nurse Call, BMS, CCTV, Security, Fixed Duress, Fire Panels, parties that require telephone lines and possibly others</p>
6	<p>Workstations on Wheels (WoWs) will require a place to park and be charged.</p>	<p>Workstation On Wheels (WOWS) require a location to be parked when not in use. That should include a power outlet and a data outlet. Provision of power and data will give flexibility for future devices. The current model of WOWs requires 1 charging bank per 2 WOWs. Charging backs are approximately</p>

		300mm x 180mm x 200mm.
7	Structured Cabling Pathways	Pathways used for structured cabling should coincide with service areas and corridors, avoiding traversal through sensitive clinical areas. This is to avoid interruption to those sensitive clinical areas if, in the future, additional cabling is required.
8	Intercom	Intercom should not limit the staff to answering from a fixed point. Rather, intercom voice & video should be delivered to a device carried by staff. This will require

		integration to WiFi phones and/or smartphones.
9	PA System	In addition to EWIS, the telephone system can support a PA function. This may require the fitting of IP speakers in ceiling to provide sufficient coverage. Those speaker would be a group 2 item.
10	MATV	Both coaxial cable and Cat 6A F/UTP outlets should be provided at each TV point.

14.0 Appendix C – Budget worksheets

Refer to *“Campbelltown ICT strategy budget estimates.xlsx”*