Blayney MPS

Engineering Concept Design Report

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NSW Health Infrastructure

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1	10/10/2022	Concept Design Report – DRAFT for client review		MS	CS	CS
2	24/10/2022	Concept Design Report – FINAL		MS	CS	CS
3	31/10/2022	Concept Design Report – FINAL		MS	CS	CS

Contents

1. Project Background

The Blayney MPS is a small rural health facility located in the Southern Sector of the Western NSW

The Blayney MPS will provide:

- Residential aged care accommodation providing care to aged care residents with high care needs including clients with dementia who have been assessed as suitable for an MPS. Blayney MPS also provides respite care for low and high care residents.
- Inpatient services that will provide low level acute care to patients including palliative care in line with the agreed role delineation.
- Emergency services including stabilisation and management in preparation for admission or transfer of care in line with level 1 role delineation.
- Imaging services including general x-ray with a visiting Radiographer onsite from the Cowra Health Service – two days a week.
- Western NSW LHD community health, outpatient / ambulatory services and Hospital in the Home (HiTH)

Space requirements associated with the above services including shared activity/ lifestyle areas, quiet room/family room, clinical support, non-clinical support and office space are detailed in the Sched

Bed/Chair Type	Current	Proposed
Inpatient beds *Including palliative care and respite care*	5	8
Transitional aged care places	4	4
High care residential aged care places	20	20
Total overnight stay beds	29	32
ED treatment bays	2	2
Ambulatory care treatment bays (+ HiTH)	2	4
Total day only treatment bays	4	6
Total beds/chairs	33	38
HealthOne		
Consult Rooms	6	9
Dental Room	1	1
Pathology Collection	1	1
Treatment Room – GP Practice Nurse	1	1
Interview room -Mental Health	0	1

This report provides a high-level summary of engineering considerations for the current Blayney MPS project. This report shall be read in-conjunction with the architectural and other related design reports

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2. Electrical Services

2.1 Overview

This section outlines the concept design for Electrical and ICT services for Blayney Hospital.

2.2 Guidelines and Standards

The Electrical services design will comply with the relevant Australian Standards and Regulations including the following as a minimum;

- AS/NZS 61439 – Low-voltage switchgear and control gear assemblies
- AS/NZS 3000 – Electrical Installations – Wiring Rules
- AS/NZS 3003 – Electrical Installations – Patient Areas
- AS/NZS 3008.1 – Electrical Installations – Selection of Cables
- AS/NZS 3009 – Electrical Installations – Emergency power
- AS/NZS 3010 – Electrical Installations – Generating sets
- AS/NZS 1768 – Lightning Protection
- AS/NZS 1158 – Lighting for roads and public spaces
- AS/NZS 1680 – Interior Lighting
- AS 1940 – The storage and handling of flammable and combustible liquids
- AS/NS 2293 – Emergency escape lighting and exit signs for buildings
- Other relevant Australian Standards

The Electrical services design will comply with the relevant New South Wales Health Services Guidelines and regulations including the following as a minimum;

- Health Infrastructure Engineering Services Guidelines 2021

2.3 Maximum Demand Calculations

A maximum demand assessment was completed on a VA/m2 basis to determine the required incoming electrical infrastructure for the building and was based on the following information;

- VA/m2 allowances were used as outlined in the Engineering Services Guidelines August-2021 (GL2021_014)
- An overall diversity factor of 0.9 was used on the VA/m2 allowances to account for variances in the electrical load profile
- A spare capacity of 20% was used on the calculated maximum demand figure for future load growth to the building

Table 1 below shows a summary of the maximum demand assessment results. The proposed maximum demand was calculated as 395kVA including the spare capacity associated with future buildings on this campus which equates to an overall future power density of 99 VA /m2.

Functional Unit	Net Area m2	VA/sqm	kVA/Functional unit
Entry and Arrival	37	90	3
Reception/Admin	49.5	90	4
Emergency Services	151.5	110	17
Ambulatory Care	281	105	30
Staff Amenities	69	90	6
Inpatient Services	253	110	28
Residential Aged Care	620	100	62
Shared Services	90	105	9
Clinical Support	45	105	5
Non Clinical Support and Mortuary	158	110	17
Circulation (32%)	561	90	50
Travel and Engineering (23%)	533	90	48
SOA Planning Contingency (5%)	142	90	13
Carpark lighting allowance			10
Subtotal	**2990**		**303**
Future expansion			
Staff Accomodation	245	90	22
Future residential aged care (RAC)	595	90	54
Future inpatient unit (IPU)	40	105	4
Futue Health One	120	105	13
Subtotal	**1000**		**92**
GROSS BUILDING AREA	**3990**		**395 kVA**
Proposed Substation			**1 x 500kVA**
Proposed Generator			**1 x 250kVA**

Table 1

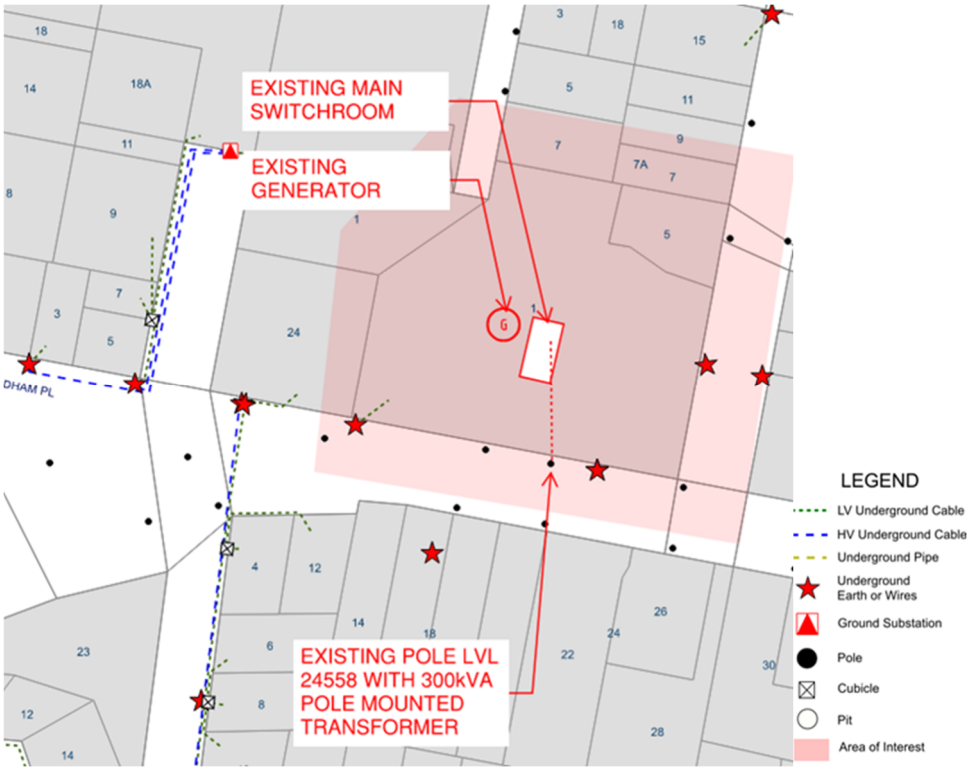
2.4 Electrical Site Infrastructure

2.4.1 Essential Energy Infrastructure –

The hospital is currently an LV customer and accepts electrical power at this voltage from the transformer to the associated LV main switchboard where power is then distributed throughout the Hospital.

A site investigation was conducted to review the existing infrastructure and the following summarises the results from the investigations.

- Overhead 11kV feeder supplied from the Essential Energy high voltage street network.
- Feeder reticulates from the overhead 11kV line in Martha Street underground to the existing LV main switchboard within the Blayney Hospital Site via Essential Energy pole mounted transformer
- Pole LVL24558 houses a pole mounted transformer (12K45), 300kVA, oil type 11kV/433kV



2.4.2 Proposed Infrastructure Strategy

Based on the Maximum demand calculation 395kVA, Jacobs team has submitted an application for additional load connection to Essential Energy on the 23rd of September 2022 on behalf of Blayney Hospital.

It is anticipated that a 500kVA 11/433V kiosk transformer will be required to support the new Blayney Hospital because the existing 300kVA pole mount transformer is the maximum size available for pole mounting.

The proposed location for the kiosk substation is on the Osman Street boundary, which is outside the building footprint and enables Essential Energy maintenance staff access to their asset on a 24/7 basis without interruption to normal hospital activity and limits the need to create extensive easement on the hospital grounds.

The location of the Essential Energy kiosk substation must be above the 1:100 year flood level for compliance with their requirements.

2.5 Emergency Backup Generator System

The existing site diesel generator is rated at 200-kVA and provides all required standby supply for the Main Switchboard of the existing facility. The existing generator does not have sufficient capacity to accommodate the additional electrical load required by the new Blayney Hospital upgrade and is approaching its end of life (manufacture date 2008). Therefore, it is proposed to install a new generator to supply the new hospital.

A new Emergency backup generator will be provided to support up to 100% of the new hospital's maximum demand with the automatic transfer switches for the essential/critical loads located within the new site main switchboard. The emergency backup generator will consist of one (1) 400kVA diesel generator. It is proposed that a complete containerized external generator with underbelly fuel tank and sound attenuation shall be provided adjacent to the site main switchboard

2.6 Main switchboards and LV distribution

2.6.1 Existing Main Switchboard

The existing Site Main Switchboard is in a poor condition, and it appears to have reached its end of life and not suitable for re-use. A new site main switchboard will be created, outside of the existing hospital footprint and all electrical services will be migrated gradually during the construction staging to the new board. The old switchboard will be demolished after all electrical services have been migrated to the new site main Switchboard.

Figure 3 below shows the existing schematic of the main switchboard and LV distribution topology for the existing hospital.

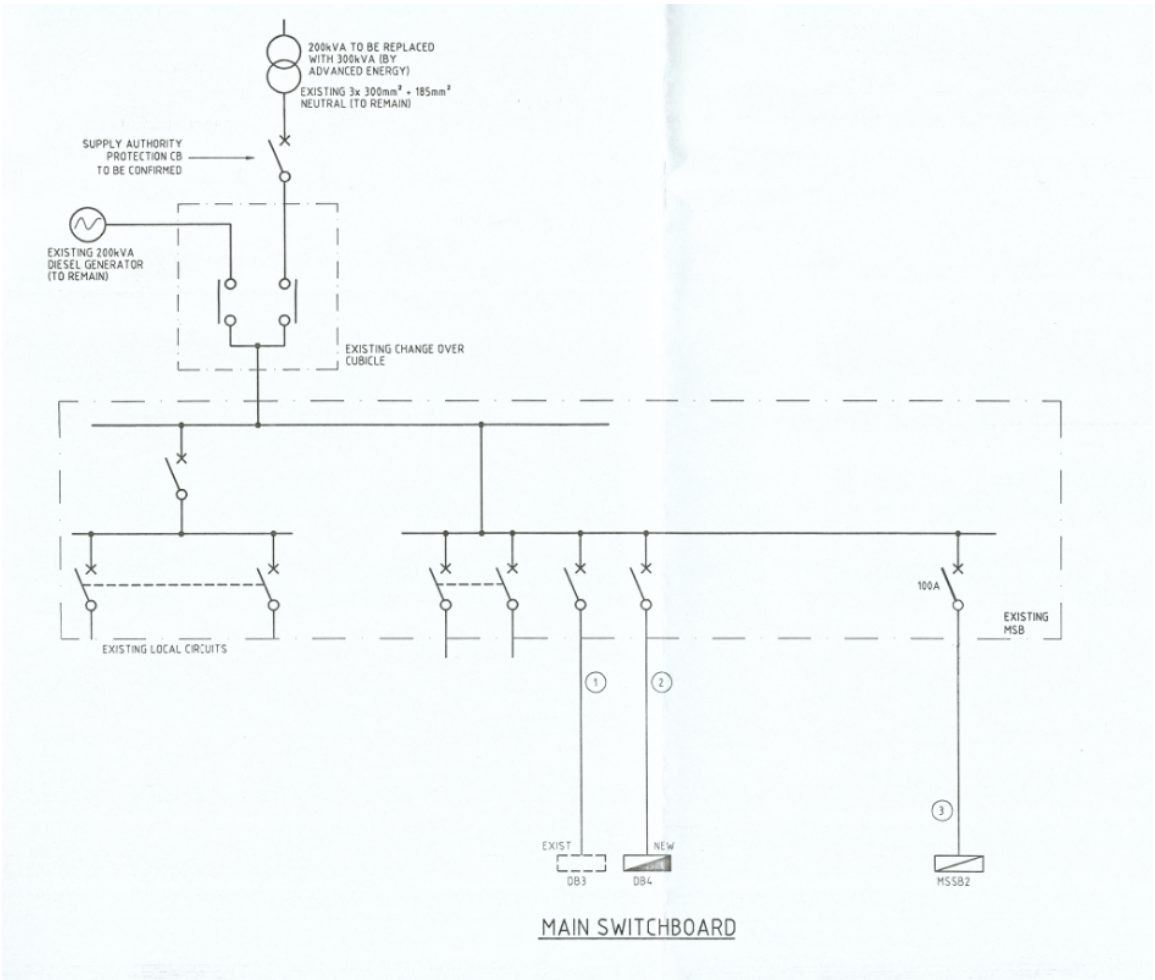


Figure 3: Existing Main Switchboard

2.6.2 Proposed Main Switchboard

The proposed main switchboard will be located outside the Hospital Main Building footprint in a 2hr fire rated room The main switch room will also house a power factor correction unit as well as the Essential Energy consumption meters

The switchboard will be Form 3B construction and will have the following sections:

- Essential – Fire and Life Safety (connected to the generator)
- Critical Services (connected to the generator)
- Non- Essential (not connected to the generator)

The incoming power supplies from both Essential Energy and the generator will be reticulated underground and enter the MSB switch room via a floor trench. A steel frame will be installed across the trench to support the MSB. The open sections of the trench will be covered with removable chequer plate such that access to the trench is readily available for installation of cables during the construction works and for future installations.

The finished level of the floor of the main switch room will be constructed so it is raised above the outside ground level and will be above the 1:100year flood level.

2.7 Uninterruptible Power Supply (UPS) System and Distribution

Two new UPS systems are proposed to serve the following systems at the new hospital:

System 1 - ICT comms

System 2 - Specific Medical outlets for critical care areas

Each UPS unit will generally be provided as follows;

- Type: Rack mounted, scalable, modular, static double online conversion, transformer-less /w internal static bypass switch
- Input/Output: 415V 3 phase, neutral and earth
- Battery: rack mounted, scalable, modular, sealed lead-acid c/w 30-minute autonomy at end of life (end of life to be 10 years)
- External maintenance bypass switch
- Monitoring: low level and high-level monitoring interface
- Control: low level interface to the SCADA system for soft-start ramp control
- UPS alarm: output I/O card for local visual and audible UPS failure alarms and faults

Each UPS output switchboard will be generally as follows:

- Form 3B construction with an IP rating IP42
- Incoming main isolators for the supply from the UPS
- Surge protection on the load side of the main isolator monitored by the EMS

- MCCB circuit breakers with integral metering and control modules connect to the site wide metering system and EMS

2.8 Distribution Switchboards

New distribution switchboards will be provided for the connection and protection of final sub-circuits for general lighting and power services. Typically, distribution switchboards will be in 2 hours smoked seal cupboards in accordance with the requirements of the NCC.

The distribution switchboards will generally be provided as follows;

- Incoming main isolator
- Form 2bi construction, IP42
- Sheet metal construction, colour electric orange x15
- Separate lighting and power chassis with a main isolator to each chassis.
- 30% spare pole capacity will be provided on the final quantity of poles fitted
- Chassis rated to 20kA for 1 second
- Protective devices will be of the miniature circuit breaker type din rail mounted to the chassis.
- Demand and energy consumption meters on each lighting and power chassis connected to a site wide metering system.
- Surge protection to both lighting and power chassis monitored by the site wide EMS
- Lighting circuits will typically be protected by a single phase 16A/20A combination overload, short circuit, and 30mA RCD device
- Power circuits to body and cardiac protected areas will typically be protected by a single phase 20A combination overload and short circuit device (local 10mA RCD devices will be provided within each associated clinical space as per AS/NZS 3003).
- Power circuits for non-body and non-cardiac protected areas will typically be protected by a single phase 20A combination overload, short circuit, and 30mA RCD device.

2.9 Cable Containment Systems

Cable containment will be using cable tray for all submain power cables.

Cable containment will be using cable basket for all final sub circuits.

Cable containment will be using a separate cable basket for all ICT services.

All fire rated cables shall be supported on fire rated tray

New services equipment will be supplied as follows;

- Sub mains to the mechanical MSSB's from the main switchboard shall be provided by the electrical contractor
- Mechanical supplies from the MSSB's to the individual items on plant shall be provided by the mechanical contractor
- Hydraulic equipment – new power supplies from local distribution switchboard and/or the main switchboards shall be provided by the electrical contractor
- Medical Gas equipment – new power supplies from the main switchboard shall be provided by the Electrical Contractor.
- Fire services new power supply from the main switchboard shall be provided by the electrical contractor

2.10 Spatial Allocation

Summary of Spatial Allocation		Room Size	Comments
Main Switchboard	Minimum circuit breaker rating to supply the following - 100A 3-Phase MCCB for RAC - 100A, 3-phase MCCB for Emergency Department - 100A 3-Phase MCCB for Inpatient Unit - 100A 3-phase MCCB for Shared services - 100A 3-phase MCCB Kitchen - 100A 3-phase MCCB for MSSB	8000mmX5000mm	Air conditioned
Generator	400kVA Diesel Generator	Housed in its own dedicated acoustic container	
Distribution Boards cupboards RAC IPU Shared Services Emergency Services Kitchen Mortuary		 2500mmX800mm 2500mmX800mm 2500mmX800mm 3000mmX800mm 2500mmX800mm 1500mmX800mm	Provide smoke seal for all distribution cupboards

3. Information and Communications Technology (ICT)

3.1 Overview

This section outlines the scope of works associated with the Electronics (ICT) services

3.2 Acronyms

AS	Australian Standard
BMCS	Building Management and Control System
CCTV	Closed Circuit Television
DAS	Distributed Antenna System
GP	Guiding Principle
HWAN	Health Wide Area Network
ICT	Information and Communications Technology
LHD	Local Health District
MATV	Master Antenna Television
MPS	Multi-Purpose Service
NBN	National Broadband Network
NZS	New Zealand Standard
RTLS	Real Time Location Service
WAN	Wide Area network
WAP	Wireless Access Point

3.3 Design Criteria

The ICT services design will comply with the relevant Australian Standards and Regulations. The specific and relevant Australian Standards.

- AS/NZS 11801.1 - Information technology – Generic cabling for customer premises – Part 1: General Requirements
- AS/NZS 11801.2 – Information technology – Generic cabling for customer premises – Part 2: Office premises
- AS/NZS 11801.6 – Information technology – Generic cabling for customer premises – Part 6: Distributed building services
- AS/NZS 3084 – Telecommunications installations – Telecommunications pathways and spaces
- AS/CA S008 – Requirements for customer cabling products
- AS/CA S009 – Installation requirements for customer cabling (Wiring Rules)

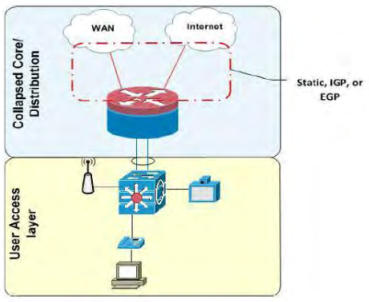
The ICT services design will comply with the relevant NSW Health guidelines and regulations including the following as a minimum;

- NSW Health Engineering Services Guidelines, Section 9
- Australasian Health Facility Guidelines
- MPS ICT Strategy Multi-Purpose Services Stage 5 Document Version 0.6
- NSW Health ICT structured cabling standard
- NSW Health WiFi Standard / Blueprint

3.4 Proposed ICT Infrastructure Strategy

3.4.1 Campus Blueprint

Blayney Hospital campus blueprint will be categorised as Small Site (Important) classification and will apply Greenfield system as per Figure 3 of the ICT Strategy.



3.4.2 Structured cabling

Structured cabling design based on the requirement to facilitate a Small Site (Important) network topology

3.4.3 Wide Area Network (WAN) Communications

HWAN (Health Wide Area Network) program will use as currently being executed by eHealth

3.4.4 ICT Infrastructure

The Blayney MPS currently has one campus distributors located in the Main Communications Room located in Acute wing. The site has the following incoming connections:

- Fibre optic from Telstra
- Incoming Cat-3 grade cable
- NBN Connection

A new Campus Distributor System and a communication network will be established under the new development and all existing communication system will be demolished after the new infrastructure system has been established.

The following services will be hosted within the Communications room;

- Nurse Call
- Master clock System
- Wi-Fi: ceiling mounted dual data outlets will be provided for WAPs
- MATV
- Health Wide Area Network (HWAN) Connection
- NBN
- A simplified MDF for Fail Safe Lines

3.4.5 Interface with Other Systems

The ICT network will provide network connectivity for:

- Security Panels / Electronic Access Control
- Security Surveillance / CCTV
- Electrical Energy Monitoring System

- Mechanical Building Management and Control System

Exclusion:

- A new DAS system is not required in line with the ICT Strategy.

3.4.6 Meeting Rooms

At this stage the number of persons per meeting room is not defined. In the next design stage, meeting rooms will be designed as per ICT Strategy section 6.8.

3.4.7 WiFi

Ceiling mounted dual data outlets will be provided for WAPs. The WAPs will be designed on the basis of 1 per 70 m^2. The design will allow for real time location (RTLS).

3.4.8 MATV

As per ICT Strategy Section 7.11, the MATV installation shall consist of free-to-air digital antenna, launch amplifier, splitters and taps over coaxial cable.

Cabling will be provided to integrate MATV with Nurse Call

3.5 Spatial Allocation

Summary of Spatial Allocation		Room Size	Comments
UPS Room		3500mmX3000mm	
Communications room	- 800 x 800 x 42RU TELCO Enclosed rack including modem, router and fire wall. - 800 x 800 x 42RU Passive patching rack - 800 x 1250 x 42RU Server and storage rack including access and core switches - 800 x 800 x 42RU Other services equipment rack including CCTV and Nurse call	4700mmX3500mm	

4. Security Services

4.1 Overview

This section outlines the concept design for Security systems for Blayney Hospital

4.2 Guidelines and Standards

Electronic Security systems and associated equipment will be designed in accordance with the following standards and guidelines:

- AS/NZS ISO 31000:2018 Risk Management: Principles and Guidelines
- HB 167:2006 Security Risk Management
- AS 4485. Security for Health Care Facilities
- AS 2201: Set. Intruder alarm systems Client's premises – Design, installation, commissioning & maintenance
- NSW Department of Health – Engineering Guidelines
- AS/NZS 62676.1-.2020: Set- Video Surveillance Systems for use in Security Applications
- AS/NZS 60839: Set- Alarms and Electronic Access Control & Security Systems requirement
- Crime Prevention Through Environmental Design (CPTED) principles
- NSW Health Policy – Protecting People & Property

4.3 Existing Security Systems assessment

The following Security systems exist and are assessed as follows within this report:

4.3.1 Access Control & Duress

Blayney Hospital operates an Inner Range Concept 3000/4000 access-control and Intruder detection system (ACID) which manages access/egress on doors throughout the facility. The Concept 3000/4000 system is an older version of the new Inner Range "Integriti" platform which would be recommended for use within the new build. Each existing Concept panel would need to be upgraded to allow integration with any new Integriti panels, which is considered unnecessary at this juncture. The Concept system will continue to provide access-control operations for the existing Hospital during construction stages however, it was considered an "end of life" system back in April 2019 and should not be used within any new buildings. Therefore, the Hospital would be a need to run two (2) separate EACS systems until the final removal of the of the Concept panels from the existing buildings. To run the two (2) systems simultaneously would also require the establishment of a new head-end location (comms room) in Stage 1 of the new works.

There are a number of fixed duress button fitted in strategic locations that communicate via the Concept System to Chubb Security for monitoring. This will continue to operate in the existing area of the Hospital, however connection of any new duress buttons in the new stages will require an additional communication path from the new Integriti panels to Chubb.

The Mobile Duress system is an Arista WI-Fi based system. Arista purchased Ekahau, and are the preferred supplier of mobile based duress systems to Health Infrastructure Hospital within NSW. The current Arista labelled system appears to have some issues with false alarming and would require servicing to ensure the required functionality. The Arista system is considered suitable "fit for purpose" and would be expanded across the new build.

4.3.2 CCTV System

The existing CCTV system on site is an IP based system with some limitations detailed as follows.

The Hospital operates a "Dahua" 64 channel NVR-based platform, which an appliance-based system and not a software-based management system which is generally considered to be the preferred CCTV solution.

To expand the Dahua system within the new build would require an additional appliance to be installed in the Stage 1 communications room. This appliance shall be connected to the existing communications room to ensure that the existing CCTV has operational continuity and monitoring during the building stages.

The existing CCTV cameras predominately appear to be all branded as Dahua, which are a popular and cost-effective solution for CCTV surveillance.

The images provided by the Dahua cameras appear to be acceptable in resolution and quality. However, consideration should be given to the installation of cameras with improved technology and capability.

4.4 Concept Design Introduction

Electronic security systems shall form an integral part of the Hospital precinct. They will be designed to aid in the provision of a secure, safe and controlled environment for staff, patients and the visiting public. Electronic security systems will support the on-going operation of the Hospital and assist in the monitoring and protection of building assets and equipment.

4.5 Access Control

The intention of the concept design for the ACID system is to provide a WLHD wide system, whilst providing Blayney Hospital with an appropriate "fit for purpose" system that has flexibility and can be expanded into the future.

As detailed previously, the existing ACID system is end of life and will lack the available technological capabilities to manage the new build within the site further and restrict the expansion of the Hospital systems into the future.

The recommendation for the upgrading of the ACID system would include a commercially available based, non-proprietary system such as Integriti , which is the upgraded version of the existing Concept System. Both systems are manufactured and supported in Australia by Inner Range.

The installation of the Integriti system will provide the following benefits now and into the future:

- Improved Technology and Capability
- District wide Standardisation
- Ability to use district wide, access control credentials

The Integriti ACID system will require the installation of a new main head-end panel and support equipment into a new communications room within the Stage 1 building/s.

The ACID system should have additional equipment and functionality as follows:

- Battery Back-up for each Panel
- Lock Power Supplies
- Connection to external monitoring (Chubb) identical to the existing Concept system
- New Workstation with Integriti Professional software suite

This new Integriti system will operate within the new building/s, whilst the Concept remains in operation in the existing buildings.

All new access credentials will be compatible with other WLHD hospitals allowing for district wide management of the access control systems into the future whilst providing Blayney Hospital with encrypted technology and a future proof solution.

The selection of peripheral equipment (lock types, closers and ancillary devices) will be coordinated with the WLHD Risk and Security Management.

4.6 CCTV

The intention of the concept design for the CCTV system is to provide a system that will provide Blayney Hospital with an appropriate CCTV platform that is expandable into the future and provides quality images (resolution) and is operationally sound.

The existing CCTV platform is a "Dahua" appliance-based NVR, that will require the integration of new additional appliances across the new building/s to integrate with the existing NVR to expand on what is a cost-effective solution providing a "fit for purpose" CCTV outcome for the Hospital.

The new NVR appliance/s and patch panels will need to be installed into a new communications room within the Stage 1 building/s. There will need to be interface with the existing CCTV NVR appliance to allow for review of both the new and existing cameras during the entire staging process. A new CCTV workstation will be installed in the new Stage 1 communications room with additional spot monitors provided at any new staff station spaces.

The selection of the Dahua NVR appliance (including HDD size and capacity) will be coordinated with the WLHD Risk and Security Management.

4.6.1 UPS (Uninterruptible power supply)

The existing CCTV system does not have any UPS support and relies on the on-site generator to back up power in the event of a mains power fail. Given that the on-site generator has lag time, prior to powering the Hospital systems, it impacts the operation of the CCTV system where the system shuts down before power can be provided.

It is recommended that a UPS be installed in the new Stage 1 communication room to provide immediate support for the CCTV system. The capability and support requirements of the UPS will be further coordinated with the WLHD Risk and Security Management.

4.6.2 Cameras

CCTV cameras to be used within the new hospital design should provide a similar resolution to the current cameras as a minimum (2.1Mp - 1080P) however, there are new improved technology cameras available in the marketplace with higher resolution and multi-lens capability.

The selection of cameras will be further coordinated with the WLHD Risk and Security Management during the detailed design phase of the project.

Camera coverage throughout the new building/s will be designed in line with the Health Standard – Protecting People and Property. Camera placement may include areas such as, but not limited to:

- Main Entry/s
- Reception
- Emergency Department
- Waiting Rooms
- Clean Utility Rooms
- Strategic External Spaces
- Carpark

4.7 Intercoms

All new Intercoms shall be IP based video/audio devices with a central server to be located in the new Stage 1 communications room. Intercoms will be installed at strategic locations such as:

- Main Entry/s
- Loading Dock

4.8 Duress

The use of dual button (under-desk mount) key reset duress buttons will be included in the new design. These buttons will be mounted in strategic locations throughout the new building/s such as:

- Nurse/Staff Stations
- Treatment rooms
- Reception / Public Facing areas

There will also be wall mounted duress button installed in spaces /rooms throughout the new building in locations to be further developed during the detailed design phase. (see images below)

Wall Mounted

Desk Mounted

4.9 Power & Cabling

All power for the security equipment to be installed in the new Stage 1 communications room will be coordinated with the electrical engineer & designer.

All proposed CCTV system cabling shall be in CAT6A and follow the communication structured cable trays. Power for the new proposed CCTV cameras will be via a required number of POE switches installed in the new building Stage 1 communications room.

There will need to be a network connection run from the new Stage1 communications room to the existing communications room to ensure that the existing systems can operate in parallel with the new systems and allow monitoring of both platforms.

4.10 Mobile Duress

The current Arista system (Ekahau) should be expanded into the new buildings. This will require additional mobile devices, Wi-Fi and switch modules and operator workstation to be installed within the new building/s at a location to be confirmed. This will be further investigated and designed as part of the communications package.

5. Mechanical Services

5.1 Overview

This section outlines the concept design for Mechanical services for Blayney Hospital.

5.2 Guidelines and Standards

Mechanical services for applicable areas will be designed to comply fully with the relevant statutory requirements including the following:

- Building Code of Australia (BCA) / National Construction Code (NCC) 2019
- Australian Standards which are applicable and/or specified
- Australasian Health Facility Guidelines
- GL2021_020 HI Engineering Services Guideline
- Workplace health and safety

General standards to comply with include:

- Electrical systems: To AS/NZS 3000, AS/NZS 3008.1.1 and SAA HB 301.
- Degrees of protection (IP code): To AS/NZS 60529.
- EMC: To AS/NZS 61000.
- Mechanical ventilation and air conditioning: To AS 1668.1 and AS 1668.2, as required by the Building Code of Australia.
- Microbial control: To AS/NZS 3666.1.
- Rotating and reciprocating machinery noise and vibration: Vibration severity in Zone A to AS 2625.1 and AS 2625.4.
- Sanitary plumbing and drainage: To AS/NZS 3500.2.
- Steelwork for equipment: To AS 3990.
- AS 1170.0 Structural design actions – Part 0: General principles.
- AS 2896 Medical gas systems
- AS/NZS 5149 Refrigerating systems and heat pumps – safety and environmental requirements

5.3 Existing Mechanical Systems Assessment

The original building was served by a radiator heating hot water (HHW) system comprising two oil-fired (later converted to natural gas) HHW units; wall mounted radiators; pipework including in-ground; calorifier for domestic hot water. The heating system was decommissioned around the year 2000 and the DHW calorifier was subsequently replaced with a DHW unit. The hospital has been progressively modified and extended over the years. Existing mechanical services were installed, replaced and extended from 2000 onwards. They include the following.

Hi-wall and ducted split air conditioning systems. Outdoor units are generally externally located around the building and some are housed in a plantroom (Palliative/Aged Care Wing). Approximately 20% of the Fujitsu split systems installed over 20 years ago, have been replaced. With the exception of some of the replacement units and those serving the Emergency Department (2015), the units are at the end of their expected economic life.

Ventilation supply and exhaust systems have a similar history to that described for heating and air conditioning systems. They are also considered to be at the end of their economic life.

Automatic controls for air conditioning and ventilation systems. Direct Digital Controls (DDC also referred to as BMS) are located in the Palliative/Aged Care Wing. The local, relatively small DDC is not locally supported and is not currently effective.

Medical Gas services comprising piped oxygen and medical air systems together with venturi suction. Gas cylinders are housed in a cupboard enclosure area outside the Nurse Station

5.4 Mechanical Services Concept Design

Mechanical services for this project will include the following:

- Air conditioning, ventilation and medical gas services to the new facility
- Modification of existing air conditioning, ventilation, piped oxygen and medical air systems during the staging phases
- Provision of a Building Management System (BMS) and automatic controls for air conditioning and ventilation systems
- Smoke management systems where required in accordance with the fire strategy. Shut down of air conditioning and ventilation systems is anticipated

5.5 System Configuration

The proposed system configuration has been developed with consideration of options, primarily a distributed plantroom arrangement each housing ducted VRF/split ducted fan coil units, condensing units and mechanical services switchboards. Following discussion with the design team it was agreed to proceed on the basis of the proposed system due to substantial benefits associated with spatial planning of the hospital and project cost.

Heating, ventilation and air conditioning will be provided by means of VRF and split air conditioning systems. Outdoor condensing units will be located in screened enclosures and ducted fan coil units will be concealed in ceiling spaces. Toilet exhausts and outdoor air ventilation systems will also be concealed in ceiling spaces. Where appropriate, ventilation heat recovery units will be provided.

A Building Management System (BMS) will be provided to enable control and monitoring of engineering systems, interfacing with proprietary air conditioning controls and generation of alarms at the hospital and remotely.

Medical gases will comprise piped oxygen, medical air and suction. Dental air and dental suction will also be provided. Oxygen and medical air systems each with automatic duty/standby bottle changeover modules, will be fed from a gas bottle enclosure. The suction system will include duty and standby vacuum pumps in an adjacent plantroom.

Mechanical systems, plant and equipment, fixings, supports, mountings, hangers and attachments will be provided in accordance with AS 1170.4 - Minimum Design Loads on Structures - Part 4: Earthquake Loads. Mechanical Services noise levels will be compliant with AS/NZS 2107 – Recommended design sound levels and reverberation times for building interiors.

6. Hydraulic Services

6.1 Overview

The Purpose of this document is to establish the concept design strategy and highlight potential risks and opportunities for building hydraulic services for the preferred option for MPS Blayney Hospital project.

A major goal is to determine the most cost effective, practical and energy efficient solutions are achieved for the proposed development.

6.2 Guidelines and Standards

The hydraulic services shall be provided to meet the requirements of the National Construction Code (NCC), Australian and New Zealand Standards and Health Infrastructure guidelines. These include but not limited to:

General		
NCC 2019 Vol 1	National Construction Code Volume 1 Building Code of Australia (BCA) 2019	
NCC 2019 Vol 3	National Construction Code Volume 3 Plumbing Code of Australia (PCA) 2019	
GL2016_020	HI Engineering Services Guidelines	
Hydraulics & Gas		
Standard	**Title**	**Revision**
AS3500.1	Plumbing and Drainage Part 1: Water Services	2018
AS3500.2	Plumbing and Drainage Part 2 Sanitary Plumbing and Drainage	2018
AS3500.3	Plumbing and Drainage Part 3 Stormwater Drainage	2018
AS3500.4	Plumbing and Drainage Part 4 Heated Water Services	2018
AS2441	Installation of Fire Hose Reels	2005
AS5601	Gas Installations	2015

6.3 Existing Hydraulic Services Installation

The existing hydraulic services within the Blayney Hospital and Health Service building and precinct include:

- Sanitary drainage & plumbing
- Roof water plumbing and drainage.
- Domestic potable cold water supply
- Domestic potable Hot/warm water supply and
- Natural Gas supply

The existing hydraulic services are to be modified and extended to suit the requirements of the new build in accordance with the staging plans and schedules. It is Jacobs understanding of the following items for consideration during the project.

6.3.1 Sanitary Drainage

The sanitary drainage (SD) connects to the Blayney Shire Council sewer in Osman Street and reticulates using a gravity 150mm and 100mm pipe system to all fixtures plant and equipment that requires liquid waste to discharge to sewer. It is understood the existing SD incorporates earthenware pipes and fittings which Jacobs

would recommend replacing with HDPE and PVC pipe material. The SD will be modified in accordance with the staging plans and schedules to maintain the existing hospital and provide for the new works. The works may be subject to Sewerage Developer Charges as part of the Council's Development Servicing Plan.

6.3.2 Roof water plumbing and drainage

Roof water plumbing and drainage will be investigated during the design phase to capture the existing condition of the system. It is understood the system is suitable for modification and extension in accordance with the staging plans and schedules to maintain the existing hospital and provide for the new works.

6.3.3 Domestic Potable Water Supply

It is Jacobs understanding that the main hospital supply extends from the Central Tablelands Water 200mm water main in Martha Street and is 50mm in size. The existing water supply should have sufficient capacity (flow & pressure) to supply the new development and will be confirmed during detailed design and consultation with Central Tablelands Water. There is a secondary connection to the existing Central Tablelands Water 150mm water main in Osman Street. Flow and pressure readings will be required to confirm the performance of the systems alongside water quality reports during the design phase.

6.3.4 Domestic Potable Hot/warm Water Supply

Hot water is generated from dual 265 litre gas storage hot water heaters. It is assumed the hot water reticulates through the facility with warm water controlled by thermostatic mixing valves (TMV). It is also understood that the system incorporates a solar pre-heat system which is reported to be underperforming.

6.3.5 Natural Gas Supply

The natural gas system connects to the Agility gas main in Osman Street and originally provided for heating and hot water boilers. The current demand supplies the gas storage hot water units. The supply will be maintained throughout the project.

6.4 Scope of Works

The Hydraulic Services scope shall address the following design aspects:

- Sanitary drainage & plumbing
- Roof water plumbing and drainage
- Domestic potable cold water services
- Domestic potable hot/warm water services
- Fire hose reels and
- Natural Gas services.

6.5 Proposed System Descriptions

6.5.1 Sanitary Plumbing and Drainage

New sanitary drains will be constructed to the requirements of AS3500.2 2022 and Health Infrastructure requirements.

Sanitary Plumbing and drainage will incorporate a pit and pipe construction to convey liquid waste by gravity to the Blaney Shire Council sewer main and will be confirmed during detailed design. If a gravity system is unachievable a pump out pit will be provided. Liquid waste discharges that are prohibited from entering the Blayney Shire Council sewer system will be classified as trade waste. The discharges may be either contaminated or high in temperature or both created by processes including cooking (kitchen), medical equipment, decontamination showers and mechanical equipment. Where it is required the trade waste system will

incorporate pre-treatment devices for retention and/or treatment which may include - basket arrestors, dilution pits, cooling pits or grease arrestors. The final selection of the pre-treatment device(s) will be coordinated with the Blayney Shire Council policies and requirements.

Pipe materials and fittings will use PVC with solvent cement joints. Pipes and fittings conveying prohibited waste discharges including temperatures above 60^0C will be use high density polyethylene (HDPE) pipe and fittings with fusion welded joints.

Proposed works requirements

Description	Comments
Minimum pipe size-drainage	Inground -100mm Above ground - 65mm
Minimum pipe grade	65mm - 2.5% 100mm – 1.65% 150mm – 1.00%
Inspection openings	In addition to AS3500.2, accessible inspection openings to be provided adjacent to each WC or bank ofWC's

6.5.2 Roof Water Plumbing and Drainage

New roof and stormwater drainage will be constructed to the requirements of AS3500.3.2018 and Health Infrastructure requirements.

Roof water plumbing from new building will be designed to discharge the 1.100/year rainfall intensity with overflows to cater for surcharge and blocked outlets at maximum flow. Down pipes will be discharged into the main civil stormwater trunk main system via gravity. Consideration of a rainwater harvesting system providing a secondary non-potable water supply will be confirmed by consultation with the Ecological sustainable Development consultatnt.

Roof water drainage pipe materials and fittings will PVC with solvent cement joints with the selection of rainwater products by the Architects.

6.5.3 Domestic Potable Water Services (Hot, Warm and Cold)

New domestic water supply will be constructed to the requirements of AS3500.1.2018 and Health Infrastructure requirements.

The water supply will extend from the existing Central Tablelands Water 200mm water main in Martha Street and is extend to all fixtures, plant and equipment that requires potable cold water. The service will reticulate to all fixtures plant and equipment that requires potable cold water. Pipe materials and fittings will use copper with silver solder joints. Pipes and fittings reticulating to fixtures comprising 16 and 20mm will be Type A PEX and approved fixing methods. Where required by AS/NZS3500.2 - backflow prevention devices will be installed and the service downstream of the valve will be considered to the non-potable water. When this is required there will also be a backflow prevention (containment) device associated with the billing meter.

Additional domestic water storage tanks and booster pumps will not be required for this project.

Water meters will be installed to all main water user equipment, together with isolation valves.

Dual water filters to be installed to sensitive equipment or where water quality is recorded and being below standard.

Proposed works requirements

Description	Comments
Maximum pressure at fixture outlets	500kPa
Minimum pressure at fixture outlets	200kPa
Minimum pressure at fire hose reel	210kPa (plus or minus 10kPa)
Maximum cold-water flow velocities	1.5m/sec
Isolation Valves	Isolation valves to be provided as shown on drawings to allow staged shut down for maintenance or emergency whilst minimizing disruption to other, non-affected, operational areas. Any valve that can prevent flow of water to the hose reels must have durable tag. (FIRE SERVICE VALVE CLOSE ONLY TO SERVICE FIRE HOSE REELS)

6.5.4 Domestic Potable Water (Hot/Warm)

New domestic hot and warm water supply will be constructed to the requirements of AS3500.4:2018 and Health Infrastructure requirements.

Existing hot water plant is to be reviewed and depending on age and condition with a preference for renewal with the location finalised respecting the staging requirements. The space requirements for the new system will be 2.5m x 3.0m, with access to the roof for the flues. The existing solar preheat system will be reviewed with a view to reuse the collectors, pumps and controls. Pipe materials and fittings will use copper with silver solder joints. Pipes and fittings reticulating to fixtures comprising 16 and 20mm will be Type A PEX and approved fixing methods.

Thermostatic mixing valves to match the existing building thermostatic mixing valves. TMV's complete with remote monitoring is preferred.

Description	Comments
Maximum pressure at fixture outlets	500kPA
Minimum pressure at fixture outlets	200kPA
Maximum "dead leg" volume	2 litres from main branch to fixture or maximum 3 meters in pipe length to the fixture outlet (or less than 10 metres)
Maximum hot water flow velocities/temperatures	2.0m/sec - 65^0C

Maximum hot water return velocities/temperatures	2.0-1.0m/sec - 60^0C
Isolation Valves	Isolation valves to be provided and shown on drawings to allow staged shut down for maintenance or emergency whilst minimizing disruption to other, non-affected, operational areas.

6.5.5 Fire Hose Reels

The fire hose for the new development will be placed in positions compliant with the requirements of BCA/NCC 2019 and AS2441:2005

Fire hose reels are to be placed generally within 4m of required exits to provide full coverage to the new extension and such the fire hose reels to not extend through fire rated and smoke doors.

Fire hose reels pipe materials fittings will match those approved and used for the existing building.

6.5.6 Natural Gas Services

The existing Natural Gas system will be maintained to supply the new (reused) gas hot water heaters the connection to the exiting Agility gas main in Osman Street maintained with the location of the billing meter and pressure regulator coordinated with Civil and Architecture.

Description	Comments
Maximum reticulation pressure	2.75kPa
Minimum pressure at appliance	1.75kPa
OPSO maximum pressure at meter	20kPa
Isolation Valves	Isolation valves to be provided and shown on drawings to allow staged shut down for maintenance or emergency whilst minimizing disruption to other, non-affected, operational areas.

7. Fire Services

7.1 Overview

This section of the Engineering Services Concept Design Report describes the proposed fire systems to be installed in the new Blayney Health Service building to achieve the primary fire safety objectives of the Building Code of Australia, that is, to protect the health and safety of occupants within the building.

7.2 Existing Installations

The existing fire services within the Blayney Health Service building and precinct comprise of:

- an automatic fire detection and alarm system;
- an emergency warning and intercom system;
- fire sprinklers;
- an external fire hydrant system;
- fire hose reels; and
- portable fire extinguishers and fire blankets.

7.2.1 Fire Detection and Alarm System

An analogue addressable Fire Detection Control and Indicating Equipment (FDCIE) panel (Notifier AFP-2800) is currently situated in the building's main entry foyer and monitors the fire detectors located throughout the building except for the Community Health wing. This wing and its fire detectors are monitored by a separate analogue addressable FDCIE panel, which is interfaced with the main building FDCIE. Alarm Signalling Equipment (Chubb Code Red) is connected to the main FDCIE to notify the local fire brigade.

7.2.2 Emergency Warning and Intercom System (EWIS)

An EWIS module (Inertia 200) is currently situated within the FDCIE cabinet and integrated with the building's fire detection system. The EWIS module serves the warning speakers located throughout the building and Warden Intercom Point (WIP) phones in various departments and wings.

7.2.3 Automatic Fire Sprinkler System

A fire sprinkler control valve is currently located at the northern end of the western wall of the kitchen. The area protected by this fire sprinkler system is not known.

A fire sprinkler control valve is also currently located at the eastern end of the southern wall of the Community Health wing. The extent of fire sprinkler protection in this wing is also not known.

7.2.4 Fire Hydrant System

An external fire hydrant system serving the building currently comprises of a dual booster inlet assembly located within sight of the main entry along Martha Street, and two dual-outlet pillar fire hydrants (one on the south-eastern boundary near the car park and one adjacent to the kitchen).

7.2.5 Fire Hose Reel System

Fire hose reels are currently located adjacent to exits and fed from the domestic potable water supply system serving the building.

7.2.6 Portable Fire Extinguishers and Fire Blankets

Portable fire extinguishers and fire blankets are currently installed throughout the building.

7.3 Scope of Works

The Fire Services scope for the new Blayney Health Service building shall address the following design aspects:

- Automatic Fire Detection and Alarm System;
- Emergency Warning and Intercom System (EWIS);
- Automatic fire sprinkler system;
- Fire hydrant system; and
- Portable fire extinguishers.

Fire hose reels shall be provided under the Hydraulic Services scope of works. Refer to the Hydraulic Services section of this Report for more information.

7.4 Guidelines and Standards

The fire services will be provided to meet the requirements of the National Construction Code (NCC), Australian and New Zealand Standards and Health Infrastructure guidelines. These include:

Reference	Title	Revision
NCC Volume 1	National Construction Code, Volume 1 Building Code of Australia (BCA)	2019 Amendment 1
GL2021_014	HI Engineering Services Guidelines	2021
AS 1670.1	Fire Detection, Warning, Control and Intercom Systems – System Design, Installation and Commissioning – Part 1: Fire	2018
AS 1670.4	Fire detection, warning, control and intercom systems – System design, installation and commissioning – Part 4: Sound systems and intercom systems for emergency purposes	2018
AS 2118.1	Automatic fire sprinkler systems – Part 1: General requirements	2017
AS 2304	Water storage tanks for fire protection systems	2011
AS 2419.1	Fire hydrant installations – Part 1: System design, installation and commissioning	2005
AS 2444	Portable fire extinguishers and fire blankets – Selection and location	2001
AS 2941	Fixed fire protection installations – Pumpset systems	2013

7.5 System Descriptions

7.5.1 Automatic Fire Detection and Alarm System

An automatic fire detection system shall be provided throughout the building in accordance with the relevant requirements of the BCA 2019 Amendment 1 and AS 1670.1:2018. The system shall incorporate the following features:

- Analogue addressable Fire Detection Control and Indicating Equipment (FDCIE) shall be located at the Designated Building Entry Point (DBEP) in the main entry/reception area/foyer;

- An external visual fire alarm indicator (strobe) visible from the main approach to the building shall be provided adjacent to the min entry to identify the DBEP;
- The FDCIE shall be connected to an essential services power supply as its primary power source and be provided with a secondary power source consisting of a rechargeable battery back-up;
- Addressable point-type photo-optical smoke detectors shall be provided below ceilings and within concealed spaces throughout all areas of the building, and point-type rate-of-rise heat detectors shall be used in areas considered more suitable for the application or where the room environment has the potential to generate spurious alarms, such as ensuites, kitchens, laundries and the like;
- Addressable point-type photo-optical smoke detectors with duct probes shall be provided within outside air intake ductwork to automatically stop fans and prevent the ingress of smoke from outside;
- Duct probe photo-optical smoke detectors with sampling pipes shall be provided within mechanical ventilation ductwork where required,
- Manual Call Points (red break glass alarms) shall be provided adjacent to each exit of the building to manually initiate the fire alarm system;
- Mimic panels shall be provided at Nurse Call Stations and elsewhere, as appropriate;
- Hard-wired fail-safe interfaces shall be provided to individual Mechanical Services Switch Boards (MSSBs) to initiate automatic shutdown of mechanical air handling systems serving fire-affected areas in the event of a fire alarm;
- A hard-wired fail-safe interface shall be provided to Electronic Access Control Systems, if required, to release doors as per the Security procedures in the event of a fire alarm;
- A high-level interface shall be provided to the building's BMS to allow the fire detection in the building to be also monitored from this system, if required; and
- Alarm Signalling Equipment (ASE) shall be provided to connect the building's fire alarm system to the fire alarm monitoring centre and notify the Fire & Rescue NSW Fire Station in Blayney for emergency response.

As part of the staged construction sequencing, the Residential Aged Care and Inpatient Unit wings shall be constructed and occupied before the new FDCIE is operational. The new addressable fire detection devices within these wings shall form new fire detection zones and be connected to the existing FDCIE. These devices shall, therefore, be selected to be compatible with the existing FDCIE. Similarly, the new FDCIE shall be selected to be compatible with the new fire detection field devices.

Following completion of construction of the main building, the Residential Aged Care and Inpatient Unit fire detection zones shall be transferred to the new FDCIE, and the existing FDCIE shall be decommissioned and removed. The existing connection from the ASE to the fire alarm monitoring centre shall be migrated to the new ASE of the new FDCIE.

7.5.2 Emergency Warning and Intercom System

An Emergency Warning and Intercom System (EWIS) shall be provided throughout the building in accordance with the relevant requirements of the BCA 2019 Amendment 1 and AS 1670.4:2018. The system shall incorporate the following features:

- Emergency Warning Control and Indicating Equipment (EWCIE) shall be integrated within the FDCIE cabinet or be a standalone panel adjacent to the FDCIE located in the main entry/reception area/foyer;
- A Public Address (PA) facility with a service microphone that is audible throughout all parts of the building;
- Recessed cone speakers shall be provided in false ceiling areas and horn speakers or surface mounted cone speakers in open or exposed ceiling areas in plant rooms and BOH areas;
- Warning speakers shall be located to achieve the minimum Sound Pressure Level throughout each acoustically separate space in accordance with AS 1670.1 and the speech intelligibility requirements of AS 1670.4;

- Warning speakers shall be zoned per fire detection zone as required to direct the appropriate pre-recorded verbal Alert or Evacuation message where required;
- Visual alarm devices shall also be installed within areas where excessive background noise is present and within ward areas where the alarm is adjusted in volume to minimise trauma consistent with the type and condition of residents, and shall be zoned as per the emergency zone as required; and
- Warden Intercom Point (WIP) phones shall be provided at Nurse Call Stations and elsewhere, as appropriate.

Evacuation of hearing-impaired persons will be managed as part of the building emergency evacuation procedures under AS 3745:2010 requirements.

As part of the staged construction sequencing, the Residential Aged Care and Inpatient Unit wings shall be constructed and occupied before the new EWCIE is operational. The new warning speakers, visual alarm devices and WIP phones within these wings shall form new emergency zones and be connected to the existing EWCIE. These devices shall, therefore, be selected to be compatible with the existing EWCIE. Similarly, the new EWCIE shall be selected to be compatible with the new emergency warning and intercom field devices.

Following completion of construction of the main building, the Residential Aged Care and Inpatient Unit emergency zones shall be transferred to the new EWCIE, and the existing EWCIE shall be decommissioned and removed.

7.5.3 Automatic Fire Sprinkler System

An automatic fire sprinkler system shall be provided to protect the building in accordance with the relevant requirements of the BCA 2019 Amendment 1 and AS 2118.1:2017. At this Concept Design stage of the project, pending an investigation to determine the available flow and pressure in the Central Tablelands Water-owned water main adjacent to the property, on-site water storage and pump(s) have been proposed as the water supply for the fire sprinkler system.

The system shall incorporate the following features:

- Separate fire sprinkler pipe arrays corresponding to emergency zones served by flow switches to indicate the zone of activation;
- One (1) off wet-pipe fire sprinkler control valve located in a dedicated Fire Sprinkler Pump / Valve House;
- A water motor alarm gong located on the external wall of the Fire Sprinkler Pump / Valve House;
- Fire sprinkler booster inlets;
- Sprinkler heads complying with AS 4118.1.1:1996 and listed in the CSIRO ActivFire Register of Fire Protection Equipment to suit the relevant hazard class and performance requirements of AS 2118.1:2017;
- Wall-wetting sprinklers during staging due to the proximity of the existing non-sprinklered building and the new sprinklered building, if required;
- CSIRO ActivFire Register listed components such as valves, couplings, pressure switches, etc.;
- Standard weight carbon steel pipe with sizing hydraulically calculated based on the relevant hazard class system design criteria;
- Supervision of all isolation valves associated with the fire sprinkler system with a supervisory signal sent to the FDCIE; and
- Connection to the new fire alarm system for fire brigade notification.

As part of the staged construction sequencing, the Residential Aged Care and Inpatient Unit wings shall be constructed and occupied before the new main building. The new fire sprinkler system will need to be constructed and operational as part of the Stage 1 works to allow these wings to be occupied. The fire sprinkler main pipework will therefore enter the new building at the Inpatient Unit and extend to the Residential Aged Care wing, and a capped branch shall extend to the boundary with the new main building for future extension as part of Stage 2 works.

The new fire sprinkler system, as part of the Stage 1 works, shall be connected to the existing FDCIE. Following completion of construction of the main building, monitoring of the fire sprinkler system shall be transferred to the new FDCIE.

7.5.4 Fire Sprinkler System Infrastructure

The fire sprinkler system shall be served by a dedicated boosted fire sprinkler water main. The water supply will comprise of:

- A full capacity water storage tank, sized to accommodate the greatest hydraulic demand in the hospital building;
- A tank fed booster connection located adjacent to the water storage tank to allow boosting the pressure of the fire sprinkler water supply if required by a fire truck pumping appliance;
- Automatic end suction centrifugal pumpset(s) complete with all valves, pipework and connections in accordance with AS 2941-2013 drawing water directly from the water storage tanks;
- The pumpset(s) shall be capable of providing the necessary pressure and flows of the fire sprinkler system for the whole building and shall be located in a dedicated Fire Sprinkler Pump House;
- All isolation valves associated with the fire sprinkler tank and pumpset(s) shall be monitored and a signal sent to the FDCIE; and
- A visual alarm indicator (strobe) located on the external wall of the Fire Sprinkler Pump House to alert personnel that the pump is running.

7.5.5 Fire Hydrant System

The existing fire hydrant system shall be modified as required to ensure compliant fire hydrant coverage is achieved to all portions of the new building in accordance with the relevant requirements of the BCA 2019 Amendment 1 and AS 2419.1:2005. Modifications shall include the relocation of the booster inlet assembly (as directed by the fire brigade), addition of a backflow prevention device and extension of the existing below ground fire hydrant mains to incorporate additional dual-outlet pillar fire hydrants.

The Central Tablelands Water-owned water main on Martha Street currently serving the site appears to be a dead leg. Further investigation will be required to determine the available flow and pressure in this water main and determine the most effective water supply arrangement for the fire hydrant system to dismiss the need for on-site water storage and pumps.

The system shall incorporate the following features:

- A H-pattern dual booster inlet/dual feed hydrant assembly incorporating a backflow prevention device;
- External feed/attack fire hydrants with two outlets each individually valve controlled;
- Fire hose couplings suitable for use by Fire & Rescue NSW (Storz hermaphrodite to AS 2419.4);
- A minimum flow rate of 1,200 L/min (600 L/min from 2 fire hydrant outlets flowing simultaneously) in accordance with AS 2419.1:2005;
- A minimum fire hydrant outlet pressure of 150 kPa for a feed hydrant , unassisted, and 250 kPa for an attack hydrant, unassisted, at the hydraulically most disadvantaged fire hydrant when 2 fire hydrants are flowing simultaneously at the minimum required flow rate in accordance with AS 2419.1:2005; and
- Fire hydrants located so that all portions of the building are within reach of a 10 m hose stream, issuing from a nozzle at the end of a 60 m length of hose laid on the ground.

7.5.6 Portable Fire Extinguishers

Portable fire extinguishers and fire blankets shall be provided throughout the new hospital building in accordance with the relevant requirements of the BCA 2019 Amendment 1 and AS 2444:2001.

Fire extinguishers shall be located:

- Adjacent to fire hose reels, electrical switchboards and plant equipment;
- Along paths of egress; and
- Elsewhere, as required.

Fire blankets shall be provided as required.

8. Structural

8.1 Overview

This purpose of this section is to establish the concept design strategy associated with the Structural services for the preferred option of the MPS Blayney Hospital project.

8.2 Scope of Work

The Structural scope of the project is to provide: a structural design for:

1) A structural design for the new hospital
2) Structural review of the existing structure during the staging of the works, to ensure partial demolition of the existing hospital can be undertaken through the staging.

8.3 Existing Structure

From site observations, the existing structure appears to be a single storey masonry brick construction, with lightweight corrugated steel roof. Internal partition walls are assumed to be non-load-bearing with the roof support being provided by the perimeter walls. It is expected that the masonry walls are supported on shallow foundations.

No as-built documentation has been reviewed to allow us to confirm these assumptions. The structure will need to be inspected and assessed as part of the staging process where partial demolition of the existing hospital occurs, and if the findings on site differ from the above assumption, this may have an impact on the structural design.

8.4 New Structure

It is expected that the proposed new structures will be framed using a lightweight steel frame system. The roof structure will be a combination of steel framing supporting steel purlins and prefabricated steel trusses provided by a specialist to a specification by Jacobs. The trusses will be supported by steel framing which will transfer the loads to the ground using a shallow foundation system, likely comprising pad and strip footings, pending geotechnical advice. Lateral stability will be achieved by vertical bracing members within the walls, and horizontal bracing within the roof space. The external façade will be developed with the architecture team at a future stage of the design, and can be an infill of any desired material, such as masonry, lightweight cladding, etc.

The structural scheme will be developed closely with the architect and service consultants through the schematic design phase to provide adequate space for ducting within the ceiling space.

Some structural works may be required at the interface with the existing hospital structure during the staging works. It is understood that the new structure will not be required to be fire separated from the existing hospital during the staging, as they will be considered the same fire compartment.

8.5 Design Criteria

The structural design will comply with the relevant Australian Standards and Regulations. The specific and relevant Australian Standards.

- AS 1170 – Structural Design Actions – All parts
- AS 3600:2018 – Concrete Structures
- AS 3700:2018 – Masonry Structures
- AS 4100:1998 – Steel Structures
- AS 2870:2011 – Residential Slabs and Footings
- AS ISO 13822-2005 – Basis for design of structures – Assessment of existing structures

- Other relevant Australian Standards

The structural design will comply with the relevant NSW Health guidelines and regulations including the following as a minimum;

- NSW Health Engineering Services Guidelines, Section 9
- Australasian Health Facility Guidelines

The structural design will comply with the relevant statutory codes and regulations including the following as a minimum;

- National Construction Code (NCC)
- Occupational Health and Safety Laws

8.6 Importance Level

As the building is to accommodate medical emergency and surgical facilities, it has Importance Level 4 and will be designed to fulfil a post disaster function.

8.7 Design Life

As per the requirements set out in the AS the structure will be designed to comply with a minimum 50-year lifetime durability.

8.8 Annual Probability of Exceedance

Using the determined importance level and design life of the structure, the annual probability of exceedance of the design event for ultimate limit states can be determined from Table F2 of AS 1170.0:

- Wind – 1/2500
- Earthquake – 1/2500

8.9 Loading

The building will be designed for gravity, imposed and environmental loads in accordance with AS1170.

The expected load parameters are as follows:

Table 8.1: Floor & Roof Load Parameters

Floor Type	Uniform Imposed Load (kPa)	Imposed Point Load (kN)	Superimposed Dead Load (kPa)
Stairs, ramps	5.0	4.5	0.0
Corridors, circulation areas, and foyer spaces	5.0	4.5	1.5
Wards, typical	2.0	1.8	1.8
Clinical areas	3.0	4.5	1.8
Plant rooms	5.0	4.5	2.5

Roof, typical	0.25	1.4	0.75

Table 8.2: Wind Load Parameters

Item	Uniform Imposed Load (kPa)
Location	Region A0
Importance Level	4
V_u	48 m/s
V_s	37 m/s
M_s	1.0
M_t	1.0
M_d	1.0
Terrain Category	3

Table 8.3: Earthquake Load Parameters

Item	Uniform Imposed Load (kPa)
Importance Level	4
Probability Factor, K_p	1.8
Hazard Factor, Z	0.08
Sub-soil Class	TBC
Earthquake Design Category	II
Structural Ductility Factor, μ	2.0
Structural Performance Factor, S_p	0.77

9. Civil Works

9.1 Overview

This section outlines the concept design for Civil services for Blayney Hospital.

9.2 Guidelines and Standards

The civil design will comply with the relevant Australian Standards and Regulations. The specific and relevant Australian Standards.

- AS 1428.1:2009 – Design for access and mobility- General requirements for access
- AS 2890.1:2004 – Parking Facilities – Off Street Parking
- AS 3700:2018 – Masonry Structures
- Other relevant Australian Standards
- Blaney Shire Council Guidelines

9.3 Existing Civil Services assessment

The civil works consist of the following components:

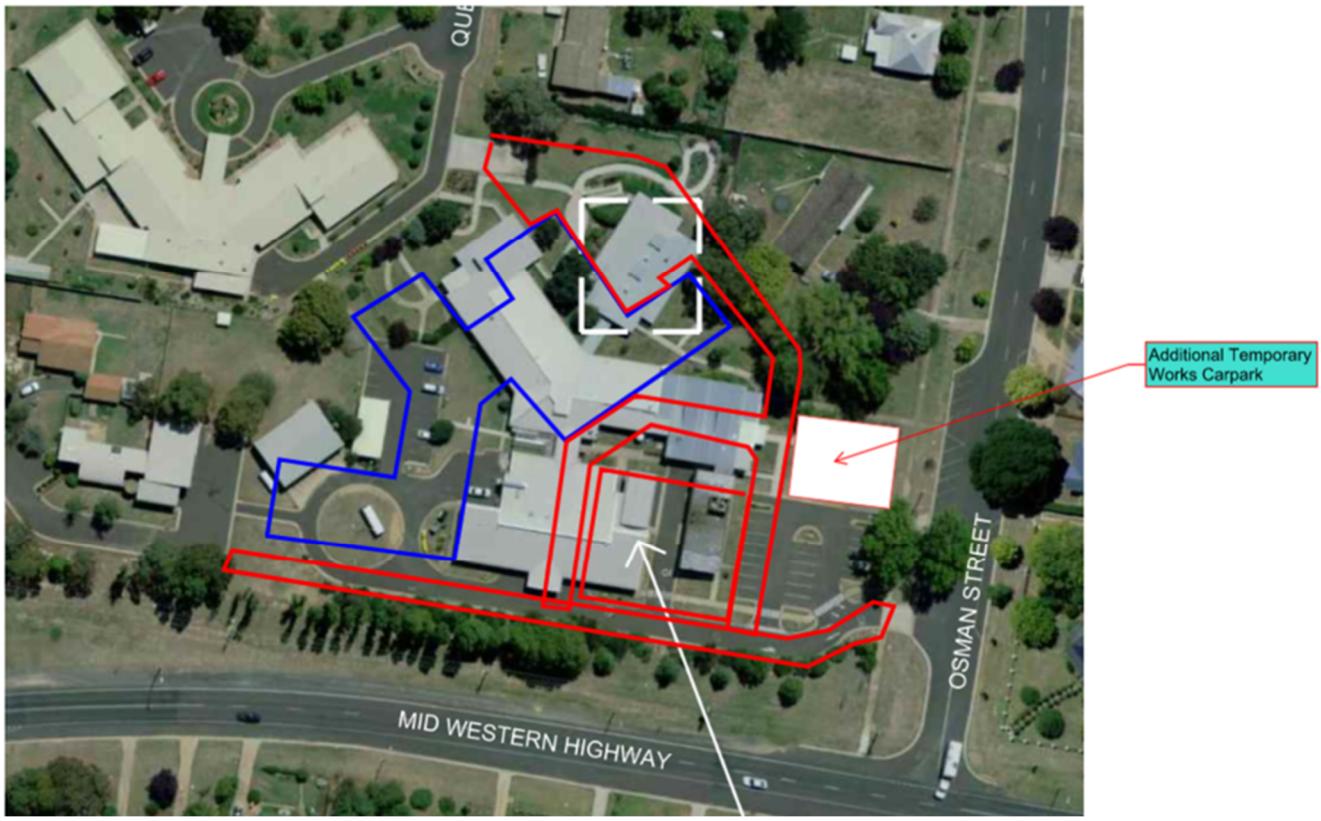
- Car parking and loading dock including asphalt surfaces and line markings;
- Access roads, concrete paths and associated civil works;
- Kerbs, gutters and channels;
- Stormwater drainage beyond the building line; and
- General site works, bulk earthworks and excavation/engineered fill.

It is envisaged to maintain the existing carpark on the corner of Osman Street and Mid Western Highway. The existing access from Osman Street and Queen Street will be maintained. There is a new driveway access from Oldham Place adjoining the new access road on the southern end of the site.

There are two (2) stormwater drainage discharge points located on Osman Street. The existing hospital drains to an existing 225 dia pipe to Osman Street. The existing carpark is connected to the other discharge point.

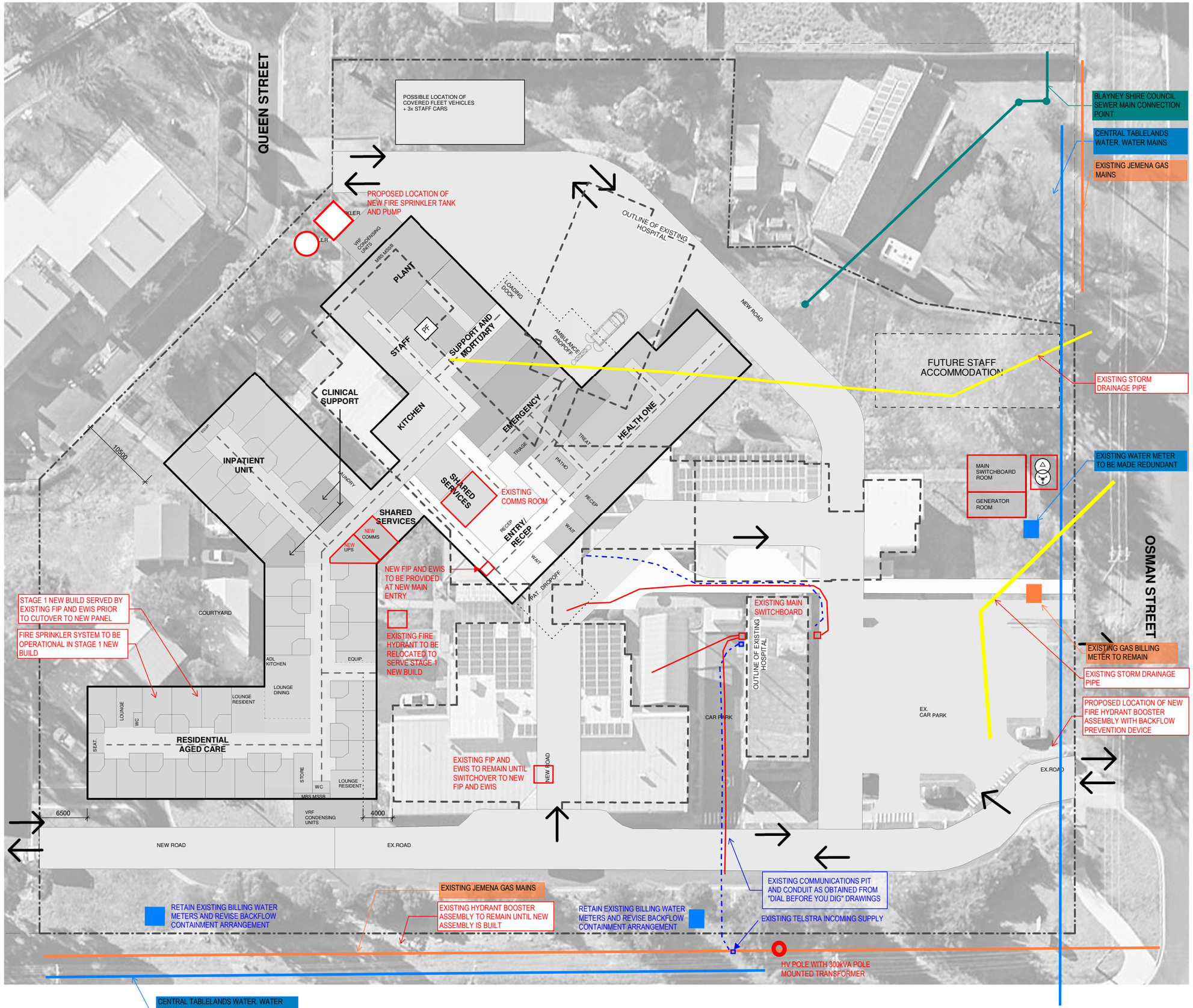
As part of the early works package, a new temporary car will be installed on the northern end of the existing carpark. This carpark is required to offset the existing parking located on the western corner of the site where the first stage of demolition works will be carried out on the existing hospital. The existing carpark contains approximately 12 car spaces.

Refer to Early works temporary carpark report.


Additional Temporary Works Carpark
OSMAN STREET
MID WESTERN HIGHWAY

Appendix A. Concept Design Drawings

Drawing Sheet Number:	Title	Rev
IA228800-BLY-EE-SK000	Combined Services Site Plan	C
IA228800-BLY-EE-SK001	Electrical Services Spatial Allocation and Reticulation	C
IA228800-BLY-MH-SK001	Mechanical Services Spatial Allocation and Reticulation	C
IA228800-BLY-MF-SK001	Fire Services Spatial Allocation and Reticulation	C
IA228800-BLY-HY-SK001	Hydraulic Services Spatial Allocation and Reticulation	C



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for
Health Infrastructure

Drawing Title
CONCEPT DESIGN FLOOR PLAN
COMBINED SERVICES
SITE PLAN

Scale 1:250 @ A1

Drawing Reference
IA228800-BLY-EE-SK000

Revision
C

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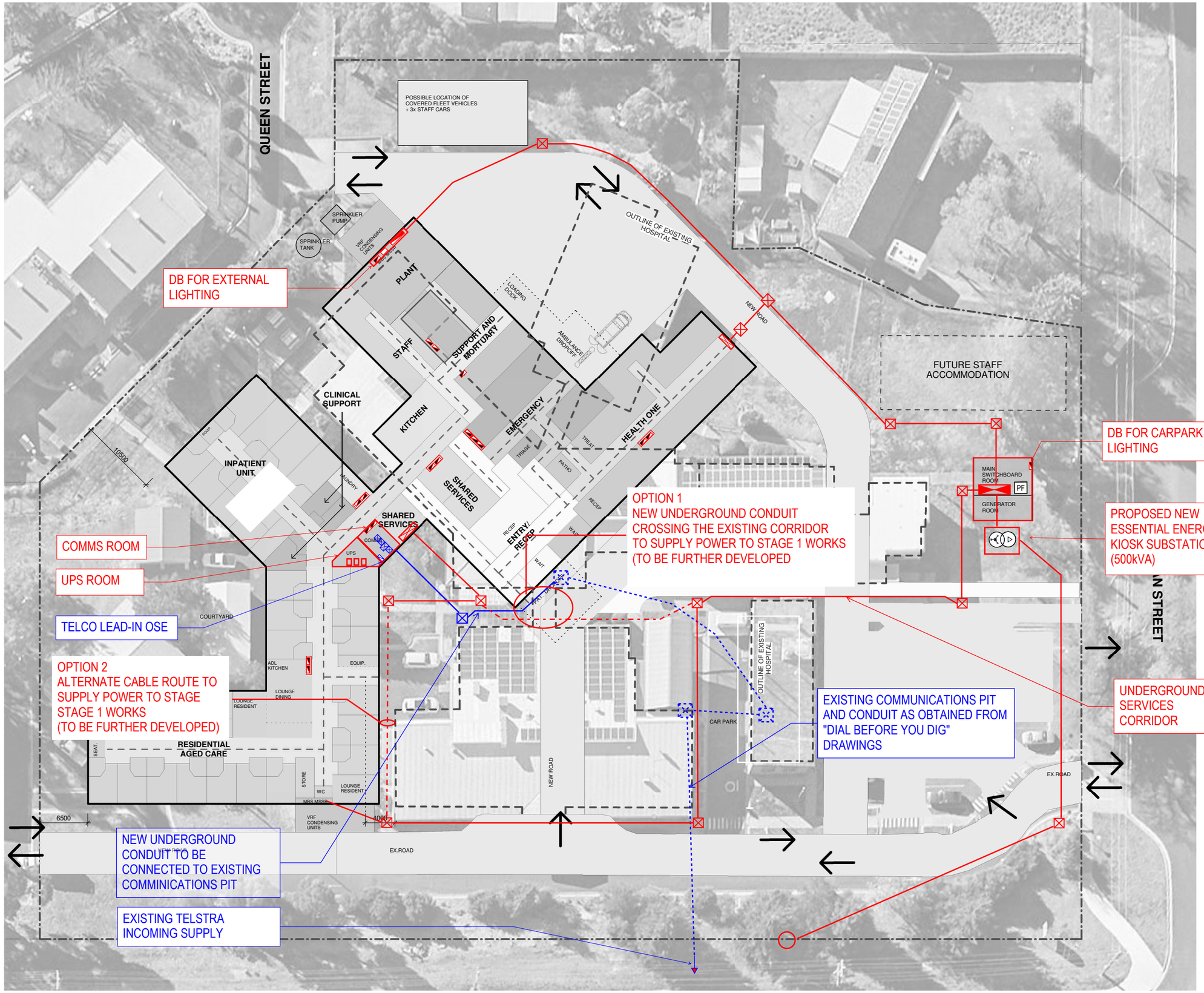

LEGEND AND SYMBOLS

- DISTRIBUTION BOARD
- ELECTRICAL CUPBOARD WITH SMOKE SEAL 3000mmX1000mm (3-DB CUPBOARD)
- ELECTRICAL CUPBOARD WITH SMOKE SEAL 2500mmX1000mm (2-DB CUPBOARD)
- ELECTRICAL PIT
- ELECTRICAL RISER
- MAIN SWITCHROOM

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Drawing Title
ELECTRICAL SERVICES SPATIAL ALLOCATION AND RETICULATION

Scale 1:250 @ A1

Drawing Reference
IA228800-BLY-EE-SK001

Revision
C

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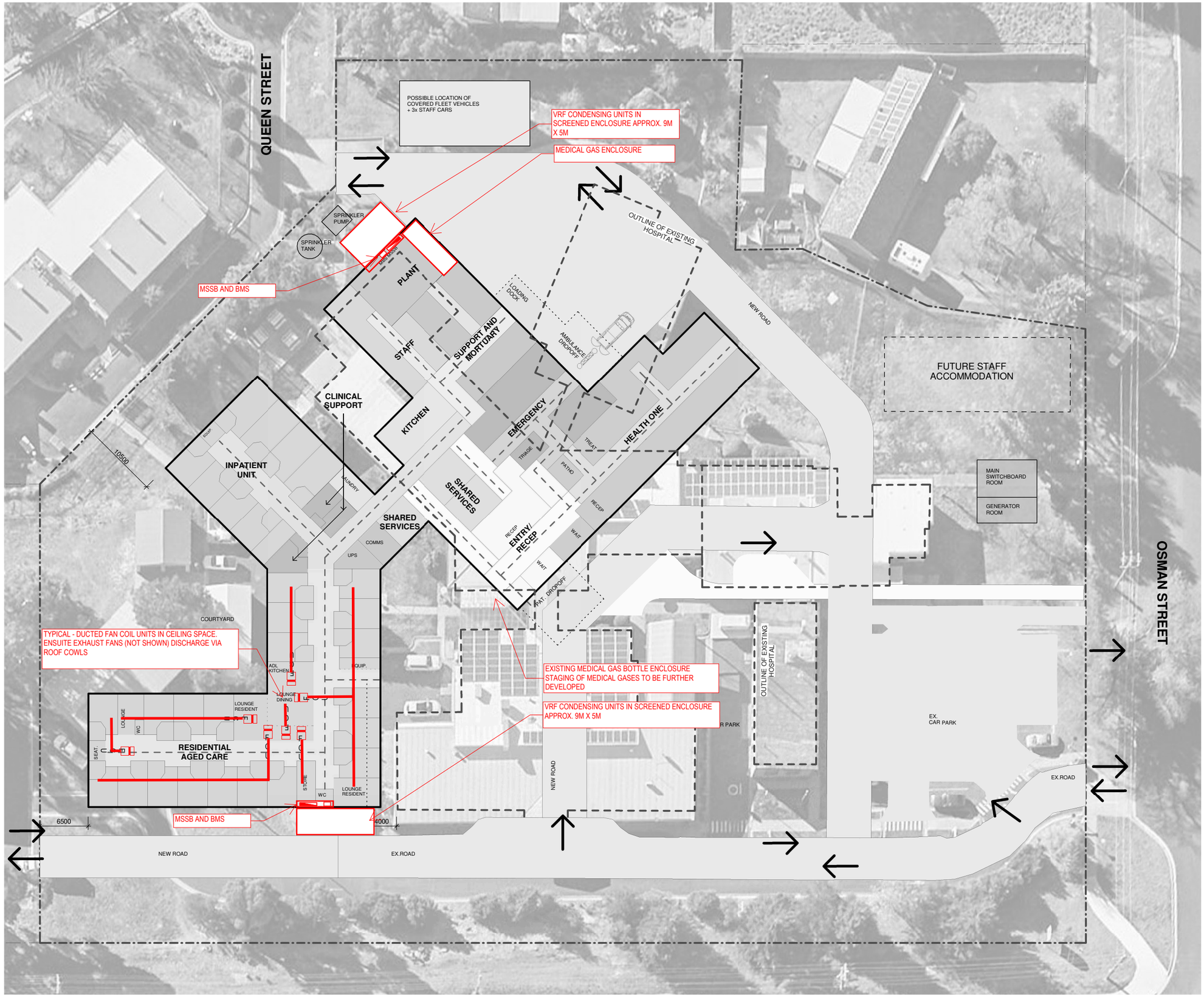

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Drawing Title
MECHANICAL SERVICES
SPATIAL ALLOCATION AND
RETICULATION

Scale 1:250 @ A1

Drawing Reference
IA228800-BLY-ME-SK001

Revision
C

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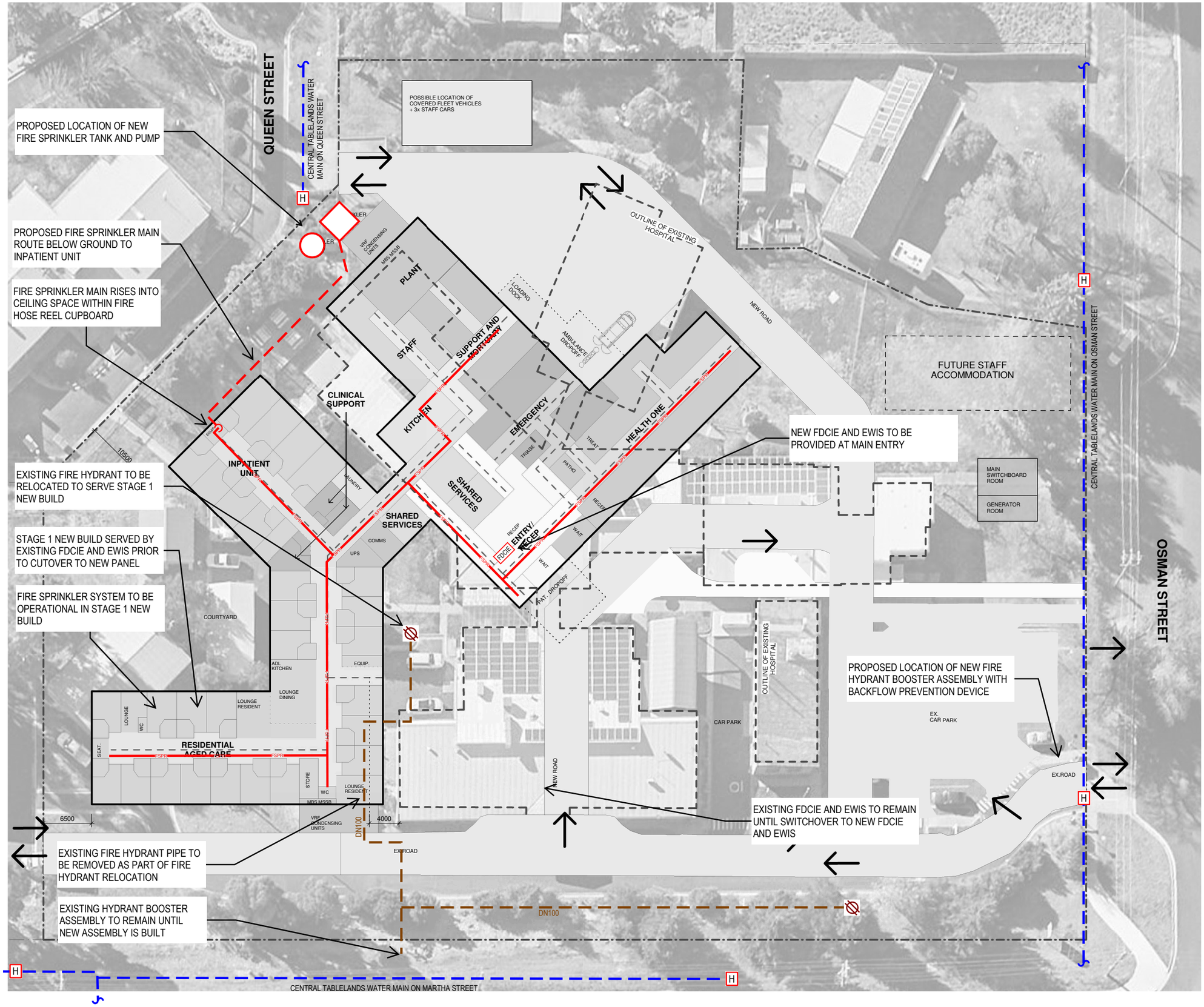

FIRE SERVICES LEGEND

FDCIE	FIRE DETECTION CONTROL AND INDICATING EQUIPMENT
	EXISTING EXTERNAL FIRE HYDRANT
H	STREET HYDRANT
	PROPOSED FIRE SPRINKLER MAIN ABOVE GROUND
	PROPOSED FIRE SPRINKLER MAIN BELOW GROUND
	EXISTING FIRE HYDRANT MAIN BELOW GROUND
	EXISTING AUTHORITY WATER MAIN

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Drawing Title
CONCEPT DESIGN FLOOR PLAN
FIRE SERVICES
SPATIAL ALLOCATION AND RETICULATION

Scale 1:250 @ A1

Drawing Reference
IA228800-BLY-MF-SK001

Revision
C

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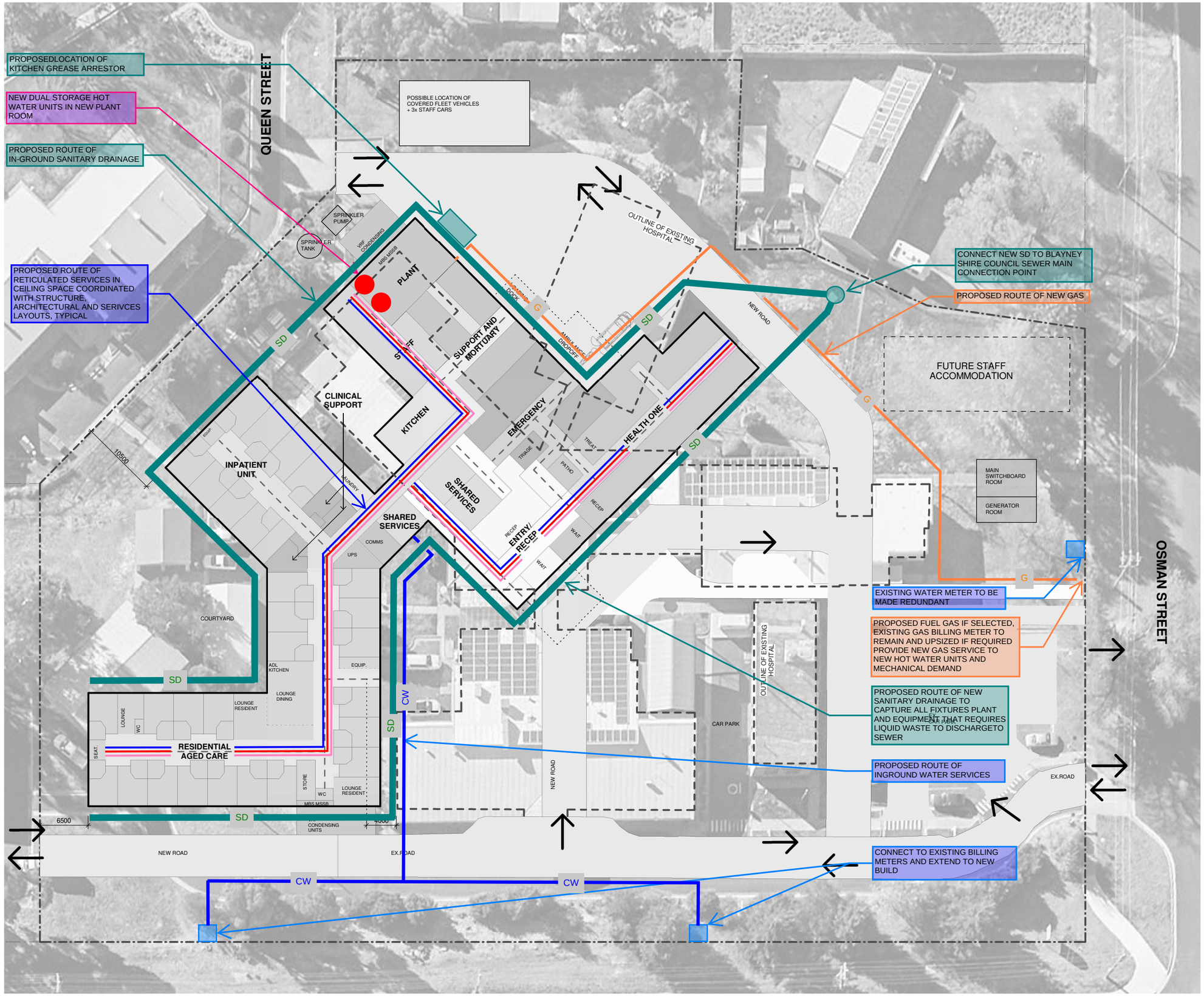

HYDRAULIC SERVICES LEGEND

SD	SANITARY DRAINAGE
CW	WATER SERVICES
G	GAS SERVICES
	RETICULATED SERVICES
	EXISTING SEWER CONNECTION
	EXISTING WATER METERS
	PROPOSED HOT WATER UNITS

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SPATIAL ALLOCATION AND RETICULATION

Scale 1:250 @ A1

Drawing Reference
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