BUILDING SERVICES ENGINEERS

INFRASTRUCTURE SERVICES REPORT

for

Wee Waa High School
105-107 Mitchell St
Wee Waa NSW 2388

Project No:
MN12159

Client:
NSW Department of Education
School Infrastructure

Prepared By:
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1 INTRODUCTION

1.1 GENERAL

NSW Department of Education, Schools Infrastructure NSW, and the Public Works Authority are preparing proposal documentation for a new high school facility in Wee Waa. This high school is being developed to replace the existing site and to provide future capacity to the region.

Marline Newcastle Pty Ltd Consulting Engineers have been engaged by Public Works Authority to provide engineering guidance on the existing and proposed electrical, hydraulic, and wet fire infrastructure required to service the new high school. This report identifies existing services within the site boundary and outlines the proposed network and site modifications that will be required to service the site.

It is important to note that the development will be subject to a number of regulatory authority's approvals including but not limited to; Narrabri Shire Council, Department of Education, Fire Rescue NSW, Essential Energy, NBN Co, and key stakeholders. Each of these parties may introduce additional requirements for the development which may affect the information within this report.
This document provides a high-level assessment of the available infrastructure to service the proposed development, but future confirmation will be required from all relevant supply authorities.

2 SITE INFORMATION

2.1 SITE

The proposed development expands through four different lots and the site is legally described as Lot 124 - DP 757125, Lot 125 - DP 757125, Lot 2 - DP 550633 and Lot 1 - DP 577294.
The development was proposed by the NSW Department of Education to serve the Narrabri Shire Council governing area and surrounds.
The new school will include construction of a new school building for core school facilities, teaching spaces, support units, Gymnasium as well an Indigenous Cultural Centre. The site is approximately 6.03ha, vacant and has no existing building infrastructure.

Figure 1.0. Aerial Map

3 AUTHORITIES

3.1 GENERAL

The relevant Hydraulic, and Electrical Service infrastructure and authorities that that have been outlined within this report include, but are not limited to the following:

- The National Construction Code (NCC BCA 2019 Amendment 1)
- Standards Australia
- Narrabri Shire Council
- Department of Education, including Schools Infrastructure
- FRNSW
- NBN Co.
- Essential Energy
- ESFG

4 HYDRAULIC SERVICES

4.1 GENERAL

All works will be subject to the appropriate documentation and requirements of council. Based on our recent assessment of Narrabri Shire Council's infrastructure documentation we anticipate that the following requirements will be applicable:

4.1 WATER SERVICES

The site has access to water mains located on Mitchell St and George St. Further correspondence to Narrabri Shire Council will determine what water main is applicable for connection.

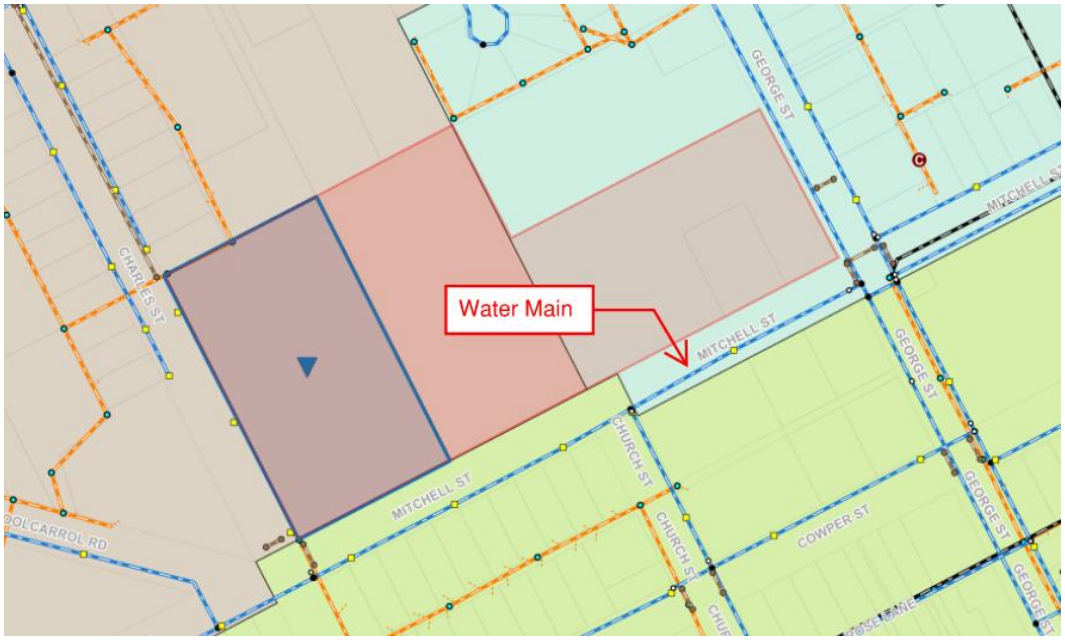


Figure 1.1. Council Service Diagram.

A water pressure/flow test is to be conducted on the existing water mains to inform us if potable water pumps and tanks are required to service the property. This will only be applicable if low pressures and flows are received.

Note: The Probable Simultaneous Flow (outlined within AS3500.1-2018) for the school has not been determined at this stage due to insufficient architectural information.

DOMESTIC COLD WATER

A domestic cold-water service will be documented in accordance with AS3500.1.2018. and Narrabri Shire Council requirements.

As per our desktop investigation, we trust that there is no existing water serving the site to cater for a new high school. Therefore, a new master water meter and water service is required to serve the new development and we believe, it is possible that the potable water services could be extended to the new High School development from the council infrastructure as described in the figure above. However, this needs to be further discussed with the local water authority and council for extension requirements. Final potable water supply will be sized in accordance AS/NZ3500.1.2018 and AS/NZS 2419. 2005 simultaneous demands.

DOMESTIC HOT WATER

As per the EFSG we would like to propose the below options for domestic hot water services. The hot water for the development will could be either of the following:

- Solar hot water system – Electric boost
- Solar hot water system – Gas Boost (LPG only)
- Electric hot water system
- Gas hot water system (LPG only)

The system will be designed and documented to the requirements of AS/NZ3500.4.2018. We require the clients input for hot water unit selection.

All hot water services piping (where necessary) shall be thermally insulated in accordance with Section J of the BCA.
Hot water piping will be insulated with Thermotech 4-Zero polyethylene closed cell insulation complete with factory applied reinforced aluminium foil covering for optimum fire and thermal performance.

Hot water will be supplied to all hot water fixture via Thermostatic Mixing Valves (TMV) which comprise accessible showers, basins and sinks within the development at a pre-set temperature of 45°C. This is a requirement apart of the NSW Government Educational Facilities Standards and Guidelines document (EFSG)

TMV Installation requirements:

- All TMV's shall be installed at maximum height of 1500mm from the Finished Floor Level (FFL) and a minimum of 300mm from the FFL for maintenance purposes.
- All TMV's shall be in an accessible location and be located within a lockable stainless-steel recessed box measuring 300mm wide x 300mm high x 70mm deep.

4.2 FIRE PROTECTION SERVICES

Currently there is no fire hydrant system serving the site.
As the proposed building's combined floor area will exceed 500m2, it will require a fire hydrant protection system. This system will be designed and documented in accordance with AS/NZ2419.1-2005 and the NCC.

The fire demand has been approximated as follows:
Fire flow for hydrants – 20 L/s

Note: The Probable Simultaneous Flow for the school has not been determined at this stage due to insufficient architectural information. If the council main fails to deliver the portable simultaneous demand, fire hydrant pumps and tanks would be required to serve fire services.

4.3 RAINWATER RE-USE

Rain/roof water shall be collected within rainwater storage tanks (sizes to be confirmed) as an alternative source for non-potable water uses for school.

It is proposed that non-potable cold water/ rainwater can be utilised in accordance with ESFG requirements to serve internal sanitary fixtures or fittings such as WC flushing. This is to minimise any risk to public health.

In addition to that, the non-potable cold-water service could be extended from the rainwater reuse system to serve site irrigation system.

A potable cold-water service with a reduced pressure zone device (RPZD) will extend to the rainwater harvesting system and reticulate to the relevant fixtures.

The potable water service is connected to the rain harvesting system so that if the rainwater is depleted, the potable water will switch over and provide the demand.

4.4 DRAINAGE AND TRADE WASTE

IN GROUND SEWER DRAINAGE

The site currently has access to Narrabri Shire council sewer infrastructure. The closest sewer connection point is located near Charles St. (circled below)

The main building will be situated on lots 1 & 2 which will be approximately 370m away from the sewer connection point.

As the property will be constructed on flat grass land, and the sewer connection point at a considerable distance, an appropriately sized sewer pumping station will be required to transfer sewer waste from the school building to the connection point. This will require further consultation with local authority for a possible sewer upgrade to serve the school.

Note: The daily total sewer discharge is the product of the number of students and the average daily discharge per students. Therefore, the final sewer load, storage volume and inground pipe calculation will be based on the number of students and the building usage. This could be identified during detail design phase.

Figure 1.2. Council Service Diagram – Existing Access Chamber Adjacent Site.

SANITARY DRAINAGE

Sanitary drainage from the school buildings will be collected via a network of correctly sized gravity sewer pipes which will connect into the sewer pump station. The sewer system will be designed and tested to AS3500.2.2018 & BCA.

A boundary trap and overflow relief gully will be provided as per the Australian Standard and council requirement.

TRADE WASTE

Some portions of the building will require trade waste as there are different spaces, each with different trade waste discharge requirements. The final sizing of these arrestors is to be confirmed.

The following trade waste measures are as follows:

- Canteen – In Ground Grease Arrestor
- Science Laboratories – In Ground Dilution Pit
- Art Classrooms– Under Bench Plaster Arrestors

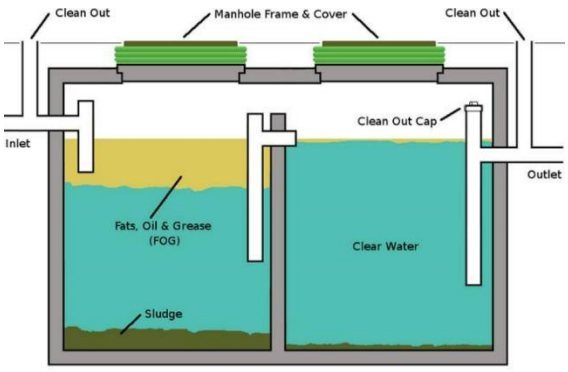


Figure 1.3. Typical Grease arrestor

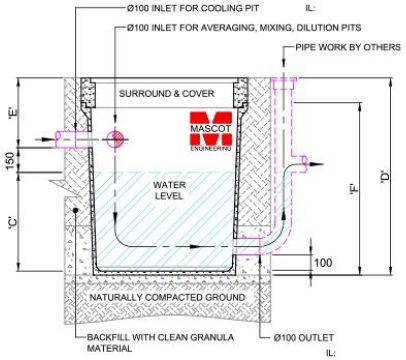


Figure 1.4. Typical Dilution Pit

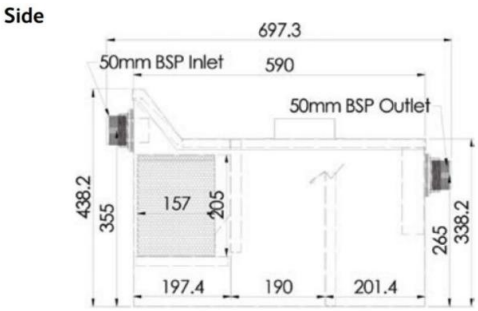


Figure 1.5. Typical Plaster Arrestor

SEWER PUMP STATION

We anticipate that the sewer pump station will be located near the main building and adjacent to an internal road/carpark for maintenance purposes. A typical system comprises of and not limited to the following:

- Storage holding well
- Dual macerating pumps
- Control panel
- Chamber vent
- Tap with RPZD (backflow) for wash down purposes
- Trash screen (adjacent to the pumps within well)

NOTE: This will require further consultation with local authority for a possible sewer upgrade to adequately size the sewer pump station to serve the school. Marline suggest an early conversation with council during concept design phase for sewer requirements.

4.5 GAS

Natural gas is not available to this property.

LPG could be installed to comply with ESFG.

Final location of gas infrastructure would be dependent on the final architectural plan and gas authority's / EFSG requirements.

5 ELECTRICAL SERVICES

5.1 GENERAL

The site is located within the Essential Energy distribution area.
Marline have undertaken a concept design for the electrical, communications, security, and fire detection services to assist with the masterplanning and design development of the new Wee Waa High School. These concept designs have been completed in accordance with the recommendations and requirements of the Department of Education Facilities Standard and Guidelines (EFSG). All EFSG requirements and DoE standards must be complied with during the detailed design development, including the requirements of the

Note: Electricity network augmentation is being undertaken under a separate planning pathway (not subject to the SSDA). Details of the proposed Essential Energy network modifications are included for information only.

5.2 ELECTRICAL SERVICES SUMMARY

The electrical system servicing the proposed new high school will include the following as a minimum:

- New supply into the site from the surrounding supply authority network
    - Preliminary ASP3 designs have indicated a 500 kVA pole mounted substation on the Mitchell Street boundary may be suitable
    - Supply into the site would be provided via an underground service pillar on the Mitchell Street frontage
- Supply authority network modifications (as per ASP3 design scope)
- Main switchboard within a dedicated room
- Electrical metering (Authority)
- Distribution boards within each level of each building
- Sub-mains including cable management systems (pits, conduits, risers, cable tray, etc)
- Power factor correction equipment if required
    - To be confirmed with supply authority
- Outlets and power supplies in accordance with EFSG requirements
- Supplies to all mechanical and hydraulics services equipment and switchboards

5.3 POWER SUPPLY AND SUBSTATION REQUIREMENTS

The site for the development is located within the Essential Energy network area. Final supply arrangement will be determined through applications and submissions to Essential Energy along with design input from the ASP3 designer.

A preliminary calculation has indicated the site is likely to have a maximum demand approaching 630A (including a 30% future growth allowance in accordance with EFSG requirements). In order to provide this supply along with the minimum spare capacity required by the EFSG, it is expected that a dedicated substation will be required. It is noted that this is subject to change pending confirmation of the site load, input from Essential Energy, and technical advice from the ASP3 designer.

The maximum demand finalisation will be subject to finalised equipment, including:

- Mechanical Services
- Hydraulic and wet fire Services
- Kitchen Requirements
- Agricultural equipment
- Other site services (pumps, irrigation, etc)

Marline Newcastle Pty Ltd will apply for supply arrangement to Essential Energy following confirmation of the preliminary maximum demand and the estimated timelines for the project. It is recommended that this is submitted as soon as possible as this is expected to be a 6 – 12 month process (minimum).

Note: Electricity network augmentation is being undertaken under a separate planning pathway (not subject to the SSDA). Details of the proposed Essential Energy network modifications are included for information only.

5.4 NEW MAIN SWITCHBOARD

A dedicated main switchboard room will be provided to house the building's main switchboard and all supply authority metering. This room must be provided to meet the minimum clearance and access requirements outlined in AS/NZS 3000and the MSB should be located within 50m of the supply authority connection pillar in accordance with the ASP3 design advice. A preliminary concept design of the MSB has been completed to identify the recommended minimum dimensions and access requirements that will be applicable.

Main Switchboard Room indicative minimum internal dimensions:
4200mm L x 2400mm W x 2400mm H with two separated 900mm W x 2000mm H clear access doors (opening outwards).

The new facility will be served a single service direct from the supply authority network to match the minimum load requirement for the proposed development (including capacity for future growth). It is proposed that the main switchboard will be of a circuit breaker type, front connected and will be housed within a dedicated 2-hour fire rated room within the building (only required if supplying Safety Services).

Supply Authority metering shall be housed within this main switchboard and will be installed to the requirements of the NSW Service & Installation Rules and the Electrical Distributor / Retailer.

The latest architectural documentation has included a dedicated room for the MSB within Building A Administration area.

5.5 GENERATOR BACKUP

No provision for future generator back has been allowed for as part of design. Client to confirm operational requirements as this is only required for schools that are identified as at risk of loss of power due to bushfire, flood, or adverse weather, and schools used for community evacuation.

Busbar terminals can be included in the MSB for connection of a temporary generator if required. It is noted that connection of a permanent generator or a facility to connect a temporary generator may require approval by the supply authority.

5.6 SUBMAINS

Sub-mains cabling shall originate from the main switchboard and be reticulated throughout the building generally via an in-ground conduit network and cable tray located within the ceiling space along accessible locations and within dedicated electrical risers. Subject to confirmation of the building height and construction, it may be feasible to reticulate submains via the sub-floor space.

The submains will be sized to AS/NZS 3008.1 to accommodate the calculated maximum demand along with the required spare capacity as per EFSG requirements.

5.7 DISTRIBUTION BOARDS

Distribution boards shall be provided for normal supply and will be located to suit the proposed layout. A minimum of 1 switchboard per level per building will be required to minimise riser sizes.

Dedicated electrical distribution boards will be distributed throughout the facility. Spacing of the distribution boards will be such that sub circuits will generally not exceed 40m. All distribution boards will be fitted with Residual Current Device (RCD) protection to all general power and lighting sub-circuits as per AS/NZS 3000.

The distribution boards will generally be IP 42 rated, of Form 1 construction, and sized to accommodate the design load plus include spare pole capacity in accordance with EFSG requirements. Where located externally, distribution boards will need to be a minimum IP65 rated.

Typical distribution board cupboard indicative minimum internal dimensions:
1400mm W x 400mm D x 2400mm H

Distribution boards will be housed in dedicated cupboard enclosures with lockable, hinged doors (E-type key). Cupboard enclosures will be fitted with smoke seals & be built with non-combustible materials when opening into an egress path and must not be accessed through a classroom. Cupboard doors will need to provide a clear access space of 900mm W x 2000mm H.

Distribution boards will be fitted with private sub-metering to separately monitor lighting and power consumption as per the requirements of the NCC Section J8 (subject to confirmation of building size).

5.8 LIGHTING

GENERAL

The interior and exterior lighting will be designed in co-ordination with the architect in accordance with the requirements of the EFSG, BCA/NCC, and AS 1680.1. Luminaires utilised within the design will be compliant with the requirements of EFSG SG951.

INTERIOR LIGHTING

The selection of internal light fittings will be coordinated with the architect and shall be presented to the client for approval prior to documentation. To ensure economic running costs and minimal maintenance costs a LED lighting solution will be implemented throughout.

All LED luminaires will utilise high colour rendering (colour corrected) lamps for enhanced lighting output and quality. Lighting colour temperature shall be confirmed by the client, should no preference be made a colour temperature of 4000K (cool white) shall be used.

EXTERIOR LIGHTING

All exterior luminaires will be selected to meet the ingress protection and impact resistant standards outlined in EFSG SG951. Generally, wall and soffit mounted luminaires will be included in the design as a preference, however some pole mounted luminaires will be required to cover external pathways and carparks.

Where required, carpark and pathway lighting will be designed in accordance with AS/NZS 1158.3.1. Refer to the external lighting strategy report for specifics of the external lighting.

Feature lighting will be provided to the front façade and signage to highlight specific areas of the building. This lighting design element is to be co-ordinated with the architect and all relevant stakeholders during the detailed design development.

EMERGENCY AND EXIT LIGHTING

Emergency and exit lighting systems will be provided throughout all areas in accordance with BCA/NCC and AS/NZS 2293.1 requriements.

5.9 COMMUNICATION SERVICES SUMMARY

GENERAL

Preliminary investigation indicate that the site is located in a NBN Co Fibre-to-the-node (FTTN) area. A lead-in-conduit will need to be provided from the boundary NBN Co infrastructure into the central communications room. Survey will be required to confirm the location of the existing NBN Co infrastructure, and extensions to this may be required by NBN Co. It is recommended an application is made to NBN Co as early as possible.

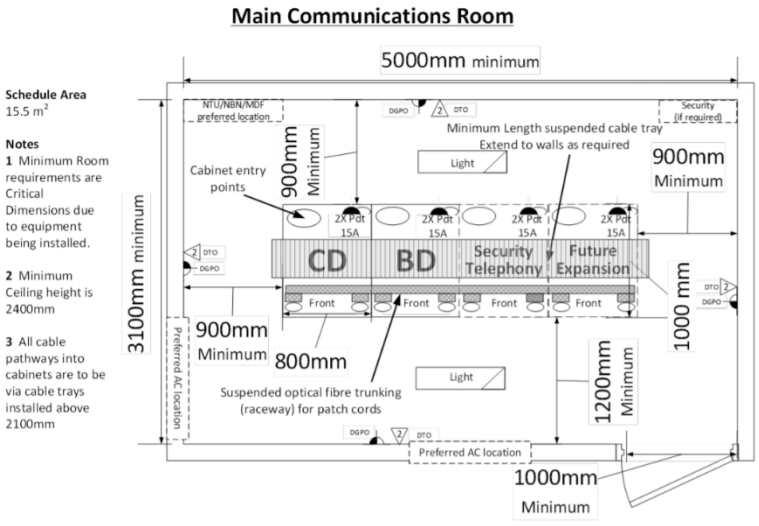
The communications systems throughout the development will be provided in accordance with the NSW DoE ITD “Structured Cabling System Specification” which outlines all minimum standard spatial, performance, and specification requirements. The system will generally include the following components:

- External pits and conduit network
- Cable management systems
- Surge protection where applicable
- Communications systems (voice/data) inclusive of structured cabling system, racks, cable support systems, etc.
- Provision for Wireless Network Access Points (WAPs)

COMMUNICATION DISTRIBUTION

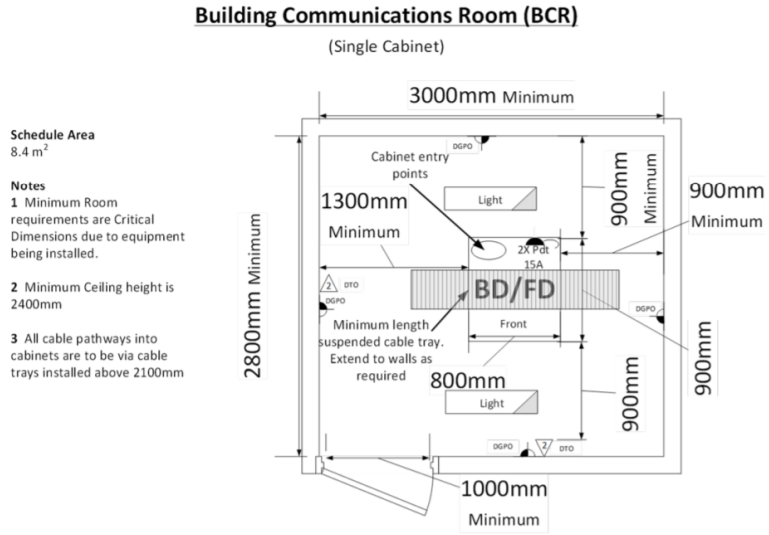
The site will be served from a central communications room, containing a minimum of 2 x 45 RU communications cabinets. This room will also house the incoming NBN Co equipment (MDF), specialist fibre services, security panels, and the school bell system.

Main communications room indicative minimum internal dimensions:
5000mm L x 3100mm W x 2400mm H with a minimum 1000mm W access door
Refer to Appendix A of NSW DoE ITD “Structured Cabling System Specification”



A communications cabinet equipment room will be required on every level of each building in accordance with NSW DoE “Structured Cabling System Specification” requirements. Each of these cabinets will be directly connected back to the central communications room to form a ‘star’ topology as per EFSG requirements.

Main communications room indicative minimum internal dimensions:
3000mm L x 2800mm W x 2400mm H with a minimum 1000mm W access door
Refer to Appendix A of NSW DoE ITD “Structured Cabling System Specification”



The current architectural documentation has shown the central communications room within Building A adjacent the library area which aligns with EFSG requirements. Additional communication cabinets will be required in each level of the remaining buildings to meet the typical EFSG requirements.

5.10 SECURITY SYSTEMS

The security systems throughout the development will be provided in accordance with the NSW DoE School Security Unit requirements which outlines all minimum standard requirements. The system will generally include the following components:

- External pits and conduit network (separate to communications)
- Cable management systems
- Intruder detection systems to all buildings, including keypads, reed switches, motion sensors, and screamers
- Duress alarm systems (TBC)
- CCTV systems (TBC)

5.11 HEARING AUGMENTATION SYSTEMS

Hearing augmentation systems complying with the requirements of BCA/NCC Section D3.7 will generally be required in all learning spaces that include permanent audio-visual and sound amplification systems. The EFSG typically recommends wireless soundfield systems to general learning spaces and other applicable small areas (compatible with Roger Phonak devices), and induction loop systems to required staff or community use areas.

5.12 DRY FIRE DETECTION

GENERAL

A fire detection system will be provided in all buildings where required to initiate automatic shutdown of any ducted air-handling systems complying with AS 1668.1 in accordance with the requirements of BCA/NCC NSW Table E2.2b, Clause 6 of BCA/NCC Specification E2.2a, and AS 1670.1 Section 7. A fire indicator panel will be required adjacent the Designated

Building Entry Point of the main building. The FIP will need to be located in a weatherproof location and must be provided with adequate clearance in accordance with AS 1670.1 requirements.

3.9.3 Clearance

A minimum clearance of 1 m in front and 0.5 m to each side shall be maintained from CIE cabinets that require operation by emergency service personnel, as shown in Figure 3.9.3.

Where the door opens to at least 135° the 0.5 m hinge side clearance may be reduced accordingly.

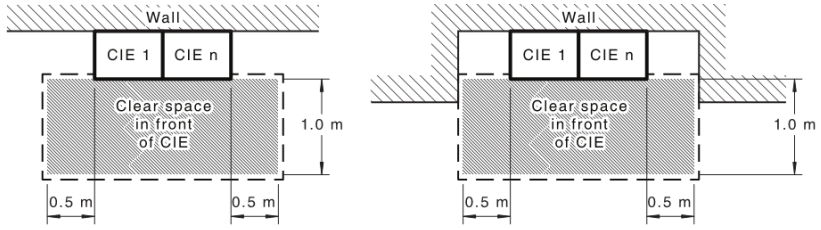


Figure 3.9.3 — Control and indicating equipment — Personnel workspace

The above is subject to co-ordination with the mechanical services design and confirmation by the project certifier and/or fire engineer.

5.13 SITE LAYOUT CONCEPT DESIGN

GENERAL

A high-level concept design of the site layout was designed to show the alignment of key electrical, communication, and security pathways with all other key site infrastructure including hydraulics, fire, and stormwater. It is recommended that all in-ground service pathways are aligned where possible to create co-ordinated site services trenches.