Electrical & Mechanical Services

Schematic Design Report

# UPGRADES TO KOGARAH PUBLIC SCHOOL

KOPS-NDY-XX-XX-RP-N-0001

Revision 4 – 06/03/2025

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# INTRODUCTION

## Introduction

This Electrical and Mechanical technical report has been prepared to support the Review of Environmental Factors (REF) being prepared on behalf of the NSW Department of Education (DoE) for the proposed Kogarah Public School upgrade (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority (NSW DoE) under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Clause 3.37 of the T&I SEPP.

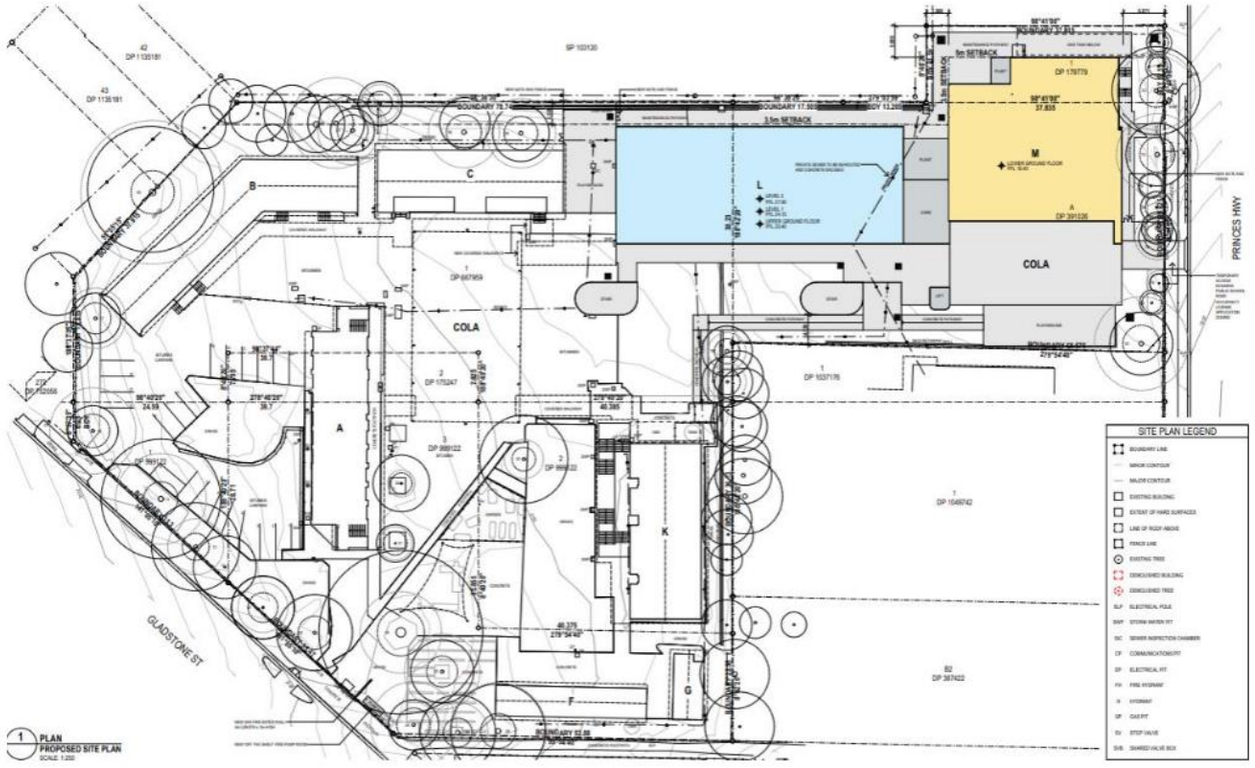
This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the Addendum guidelines for schools. The purpose of this report is to provide recommended actions and observations in relation to the Electrical, AV, Communications, Security and Mechanical systems for the upgrade at Kogarah Public School.

## Proposed Activity Description

The proposed Kogarah Public School upgrade works include the following:

- Demolition of existing playground facilities and Covered Outdoor Learning Area (COLA) in addition to footings and services associated with former demountable buildings;
- Tree removal;
- Construction of a new three storey Classroom building and attached amenities facilities;
- Construction of a single storey Hall with attached Covered Outdoor Learning Area;
- New pedestrian pathway connections providing access throughout the site;
- Service upgrades; and
- Site landscaping works.

Any works relating to the existing demountables will be undertaken via a separate planning pathway.



# INTRODUCTION

### Activity Site

Kogarah Public School is located at 24B Gladstone Street, Kogarah and contains a site area of 1.644ha per Detail Survey. The school is accommodated within the following allotments:

- Lots 1-3 DP 999122;
- Lot 1 DP 179779
- Lot 1 DP 667959
- Lot 2 DP 175247; and
- Lot A DP 391026.

The site is irregular in shape with existing vehicular access and the car park provided from Gladstone Street along the south western boundary. Pedestrian access is provided from Gladstone Street and Princes Highway. The site accommodates eight (8) permanent buildings and number of modular school buildings with play areas largely confined to the centre and north eastern portions of the site.

Development surrounding the site includes:

- North: Residential flat building at 71 Regent Street, retail tenancies orientated to Princes Highway(39-43 Princes Highway) and a smaller residential flat building at No 41 Princes Highway;
- East: Princes Highway and further to a mix of commercial and mid-rise residential development;
- South: St Paul's Church complex comprising St Paul's Childcare Centre, St Paul's Anglican Church and a residential flat building located at 24-30 Gladstone Street; and
- West: A mix of single dwelling and residential flat building development with Regent Street beyond.

The site is zoned SP2 Educational Establishment in accordance with Georges River Local Environmental Plan 2021 (GRLEP).

# LIAISON WITH AUTHORITIES

As a part of the design process NDY consulted with the following services providers:

- Shell Energy - The Kogarah PS electricity billing provider/retailer .
- Ausgrid – The Kogarah PS electrical authority.

The correspondence with these service providers is summarised below:

| DATE | AUTHORITY | REASON | OUTCOME |
|---|---|---|---|
| 17th July 2024 | Shell Energy | *Requested for last 2 years of school meter data* | Received Meter data 18/07/2024. |
| 26th July 2024 | Ausgrid | *Preliminary Enquiry Submitted in Connections Portal – NDY requested information regarding existing substation supply.* | - |
| 9th August 2024 | | *Preliminary Enquiry Response Received via email* | Summary of Information Received:<br>- Two low voltage services appear to have supplies to site. Ausgrid noted this is indicative only has Ausgrid does not record private installation information.<br>1. Network distributor No. 2 at Substation 10644 (500kVA, not upgradeable) via pillar.<br>2. Network distributor No. 1 at Substation 10163 (600kVA, upgradeable) via pillar. |
| 13th November 2024 | | *Load Application Lodged in Connections Portal – NDY requested a total new load of 605A from a new substation to be established on site.* | - |
| 10th December 2024 | | *Followed up with Ausgrid as to the expected timeframe for a response.* | Ausgrid advised they were experiencing a system outage and would progress the application on 16/12/2024. |
| 16th December 2024 | | *Ausgrid notified that the application has been progressed to Regional Manager for assessment and response.* | - |
| 20th December 2024 | | *Load Application response received from Ausgrid.* | Ausgrid provided a Design Services Offer for the installation of a new kiosk substation. |
| 20th January 2025 | | *Acceptance of Design Services Offer on behalf of SINSW.* | Acceptance processed by Ausgrid 24/01/2025. |

# MITIGATION MEASURES

| Mitigation Measures | | | |
|---|---|---|---|
| Mitigation Number/ Name | When is Mitigation Measure to be complied with | Mitigation Measure | Reason for Mitigation Measure |
| Noise | During Works<br>During normal operations | Refer to NDY Noise and Vibration Impact Assessment | Minimise noise impacts to nearby sensitive receivers. |
| Trenching | During Works | Trenching works to be completed in line with Archaeological and Heritage assessment | Site archaeological constraints. |
| Air Intakes | During Works<br>During normal operations | Air intakes are to placed away from Busy roads (Princes Highway) and outside air filtration is to be provided | To avoid adverse air quality impacts on the development. |

### Evaluation of Environmental Impacts

We note that the Noise impact can be adequately mitigated though the proposed measures and will not have a significant affect on the environment.

We note that the trenching impact can be managed mitigated though the procedures outlines in the Archaeological and Heritage assessment will not have a significant affect on the environment.

We note that the air intakes can be adequately mitigated though the proposed measures and will not have a significant affect on the environment.

# SCOPE

This report has been provided by Norman Disney & Young (NDY) to provide recommended actions and observations in relation to the Electrical, AV, Communications, Security and Mechanical systems to accommodate the upgrades to Kogarah Public School.

Recommendations and observations in relation to the Electrical, AV, Communications, Security and Mechanical services are provided herein. This schematic design has been developed in line with the SINSW Standard Hub Layout and the Pattern Book.

NDY
A TETRA TECH COMPANY

# ELECTRICAL SERVICES

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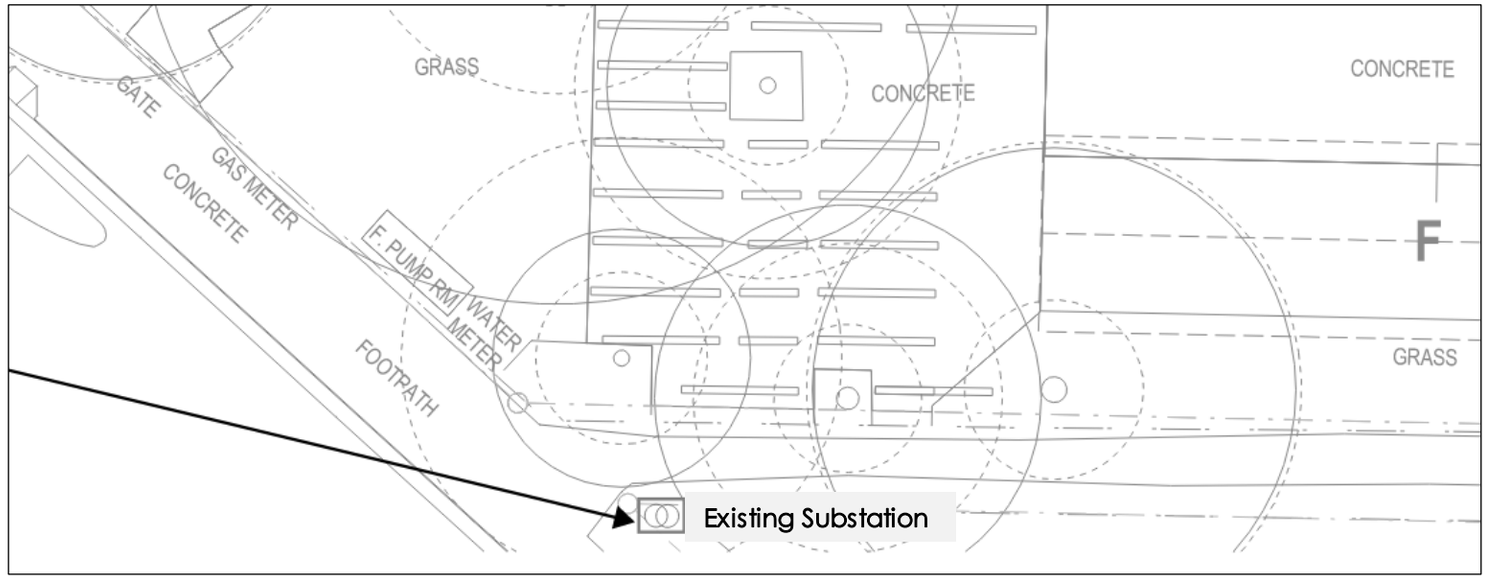
# EXISTING ELECTRICAL SUPPLY




Kogarah Public School (KOPS) is currently supplied via two low voltage supplies according to Ausgrid's preliminary advice.
One low voltage supply is via distributor No.2 at substation 10644. This substation has a 500kVA transformer and is not upgradeable.
The second low voltage supply is via distributor No.1 at substation 10163. This substation has a 600kVA transformer and can be upgraded. This substation has supplies to 2 other customers.
Based on a visual inspection of the site it appears only one supply, from substation 10163, is being utilised currently.

The school contains one main switch board located in the Admin/Staff building (Building A) which serves all sub
distribution boards throughout the site via a net work of pits and conduit. The board has the following characteristics:

- Built to AS3439.1
- Rated to 160A three phase
- Form 2 Segregation
- 25kA fault rating
- Service Protection Device rated for 160A
- Maximum demand for the site is 119A.

There is also a 7kW solar array in use at school on Building K connected to DB K.

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# ELECTRICAL LOAD ANALYSIS

**Applicable Standards & Guidelines**
The services concepts have been developed on the basis of the following:

- NCC 2022
- EFSG v1 & 2
- AS3000
- AS/NZS 1680
- AS/NZS 2293.1
- AS/NZS 1158
- NSW Department of Education Patternbook

Based on the latest maximum demand calculation for the school and our understanding of the existing electrical supply, the school will need an increase in supply from Ausgrid.

The existing MSB is not adequate for re-use due to:

- Built to older AS3439.1
- Rated to 160A three phase (insufficient for maximum demand)
- Inadequate spare physical capacity (no space for new connections)

Hence a new MSB is to be provided for the school. This new MSB is required to be installed prior to the new, larger capacity, connection being established.

| Demand Component | Load (A) |
|---|---|
| Existing School Site | 119A |
| Removal of Demountable Spaces | -40A |
| New Works | 420A |
| A/C Upgrades | 27A |
| Spare Capacity per EFSG | 79A |
| **Estimated New Maximum Demand with Spare Capacity** | **605A** |

| Capacity/Demand | Load (A) |
|---|---|
| Substation Capacity | 798A |
| Existing School Maximum Demand | 119A |
| Existing Maximum Demand of other customers | Unknown |
| **Substation Spare Capacity Before Works*** | 679A |
| Estimated New Maximum Demand with Spare Capacity | 605A |
| **Substation Spare Capacity After Works, excluding other customer demand** | 193 – other customer demands (A) |

As the other Ausgrid customers' demands are unknown, this spare capacity estimate only excludes the school's known load from the substation's total rating. It is advised the capacity of this substation will be insufficient to support works, as it is anticipated the other customer demand exceeds 193A. The necessity of a supply upgrade to site has been confirmed by Ausgrid via Design Services Offer.

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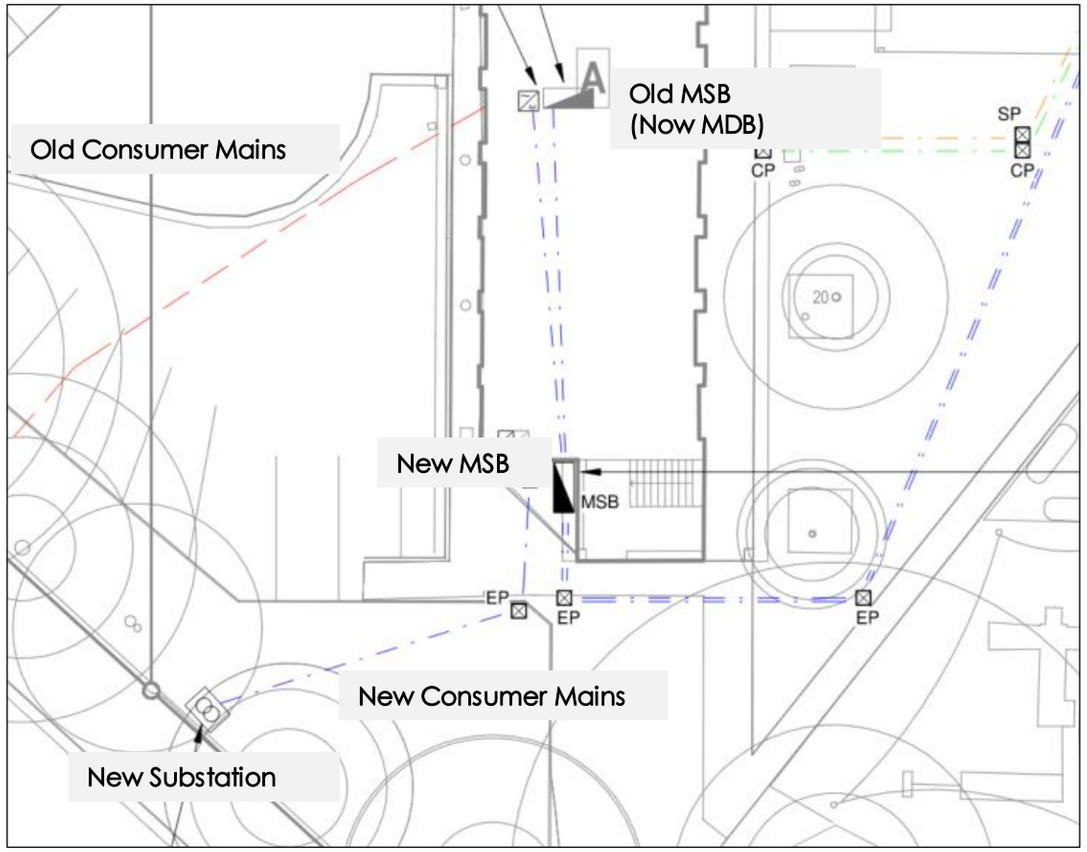
# PROPOSED ELECTRICAL SUPPLY

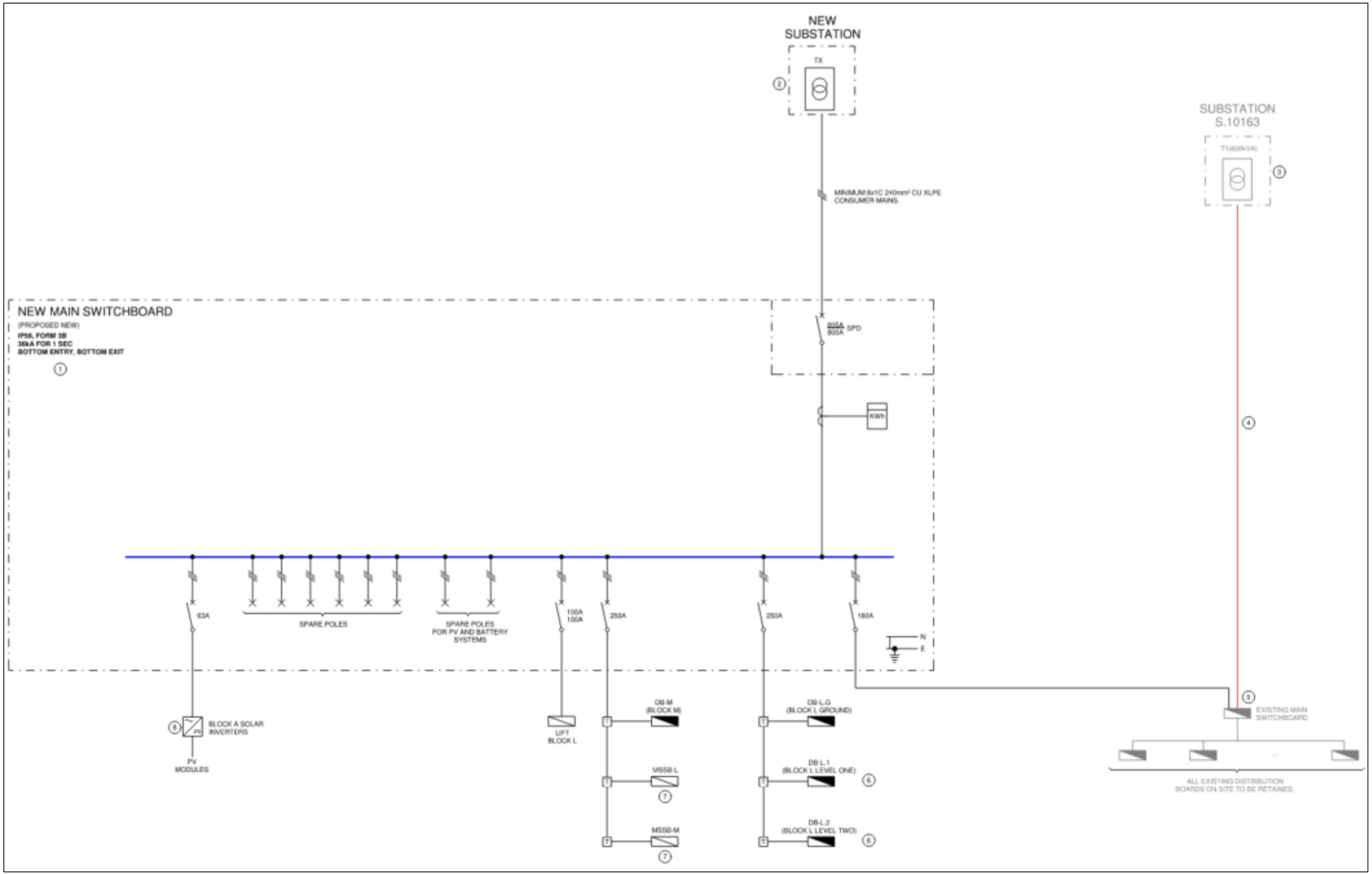



A load application was submitted to Ausgrid on 13/11/2024 for a new total school load of 605A. A Design Services Offer was provided by Ausgrid on 20/12/2024 confirming installation of a new kiosk type substation is required to support the additional load. This offer was been accepted by NDY on behalf of SINSW on 20/01/2025, and the Offer Acceptance Processed on 24/01/2025. This Design Offer is valid for a period of 12 months in order for the ASPL3 works design to be completed and submitted to Ausgrid.
A new main switchboard (MSB) is proposed to be located external to Block A, and have capacity sufficient to supply new and existing portions of the school. New consumer mains shall be provided from the new substation to new MSB. The new MSB is to be compliant with all the latest codes and standards including the NSW Service and Installation rules. The old MSB will be retained and used as a main distribution board (MDB). New submains cabling will be provided from the new MSB to the MDB.

The new main switch board will supply the new portions of the school as well as backfeed the old MSB. The board is proposed to have the following characteristics:

- Rated to 800A three phase
- Form 3B
- IP56
- 36kA fault rating for 1 sec (TBC)
- Designed to AS61439

# SITE ELECTRICAL DISTRIBUTION

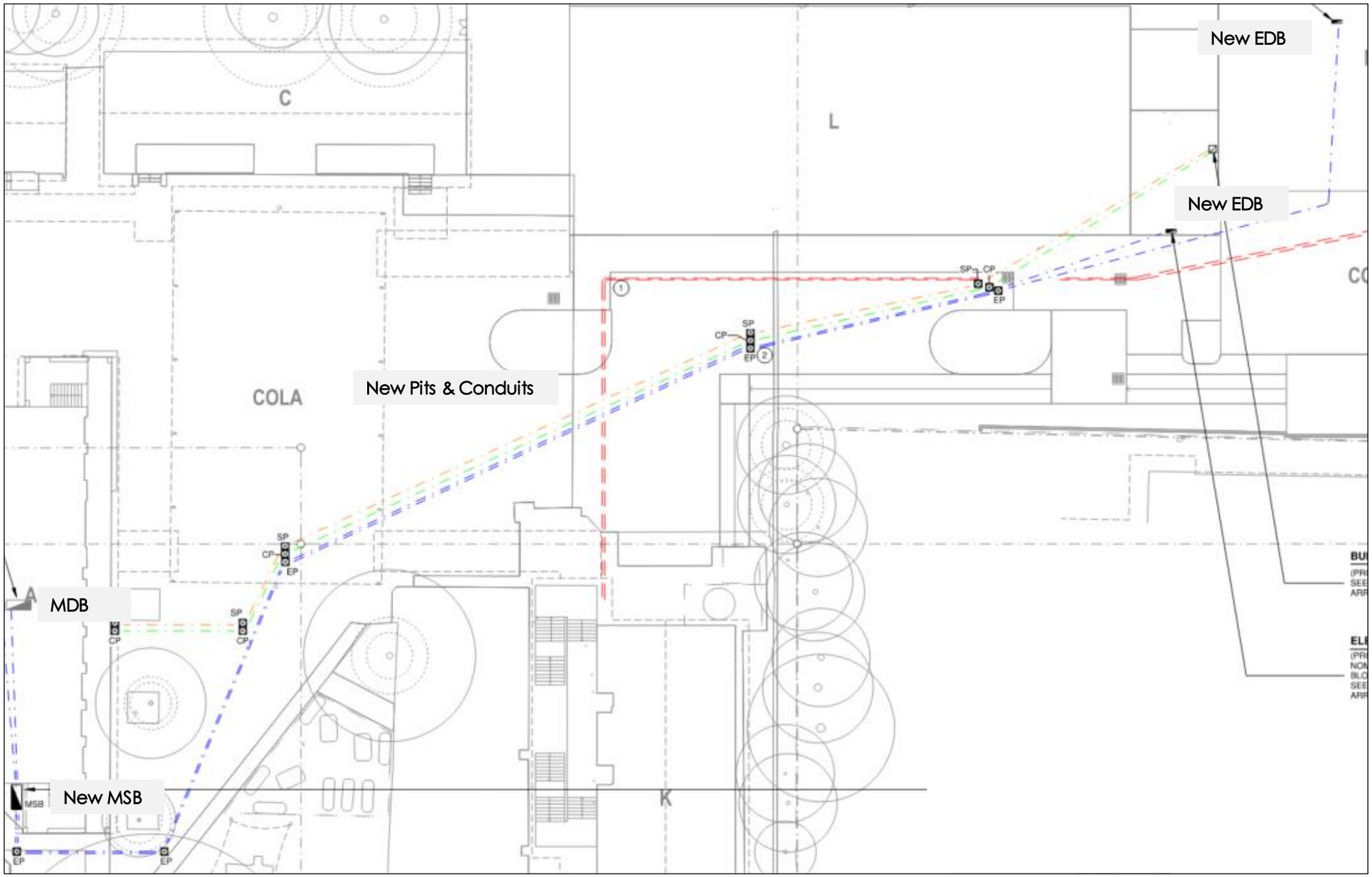



Kogarah Public School Single Line Diagram

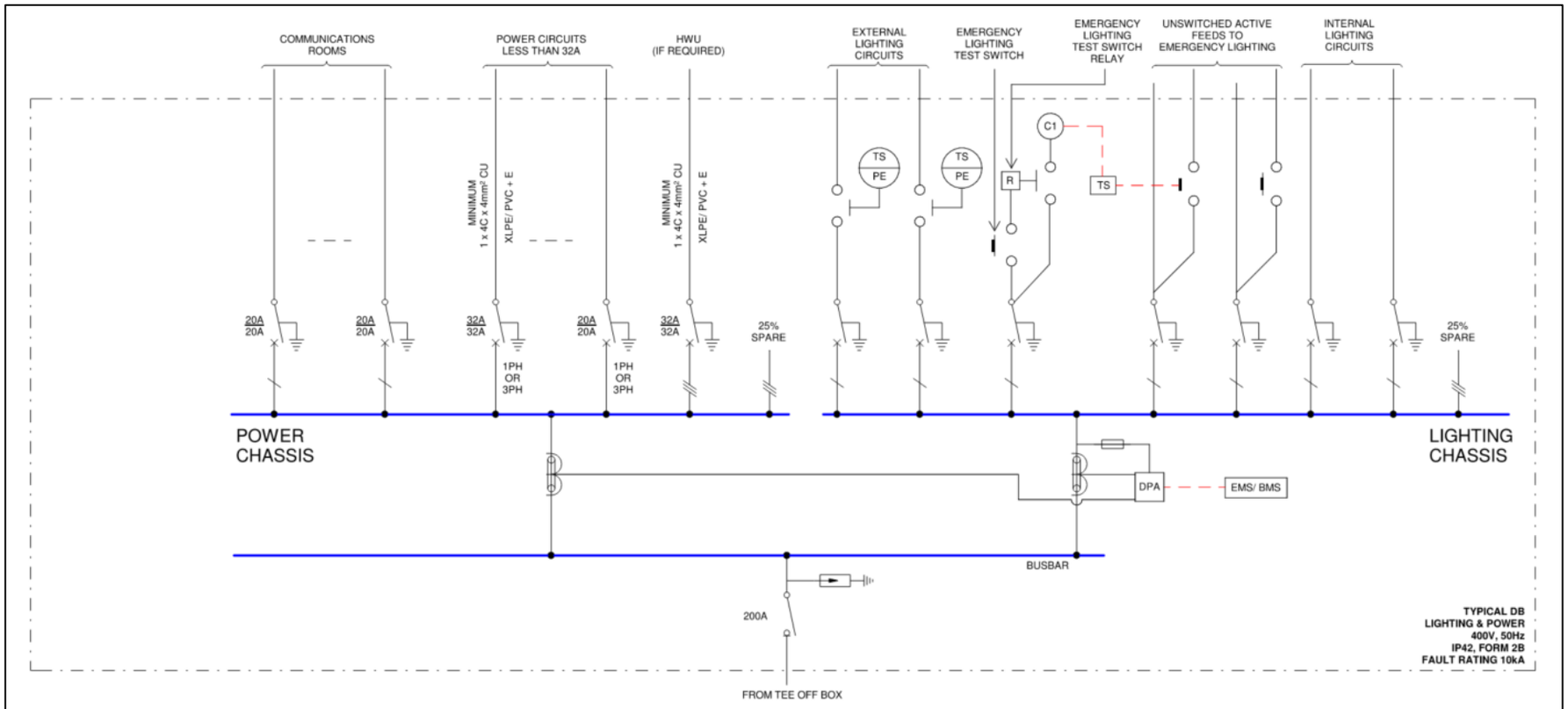
# ELECTRICAL DISTRIBUTION

The existing pit and conduit network will need to be expanded and extended to allow for the new cable pathway to the new buildings' distribution boards. This pathway will require new in-ground conduit to be installed with cable pits at 30M intervals and at changes in direction. New trenching route shown has been coordinated with other services reticulation to the new building. Trenching for services within the site and the existing school is required to comply with the mitigation measures and methodology included in the Archaeological and Heritage assessment report by Jacobs. The contractor will need to program and co-ordinate trenching and services installations in the existing school so that school operations are not disrupted, noting these activities could be extended due to the mitigation measures.

All new in-ground conduit will include spare capacity as required by the EFSG to facilitate future upgrade works if required. The new MSB will backfeed the old MSB using a new conduit pathway.



# ELECTRICAL DISTRIBUTION PROPOSED NEW BUILDINGS – BLOCK L




**ELECTRICAL SCHEMATIC:** TYPICAL ARRANGEMENT OF BLOCK L ELECTRICAL DISTRIBUTION BOARDS

The proposed new building, Block L, will include Electrical Distribution Boards (EDB) contained in appropriately designed cupboards or rooms located within the building's core. These cupboards/rooms will be 60-minute fire rated, and smoke sealed.

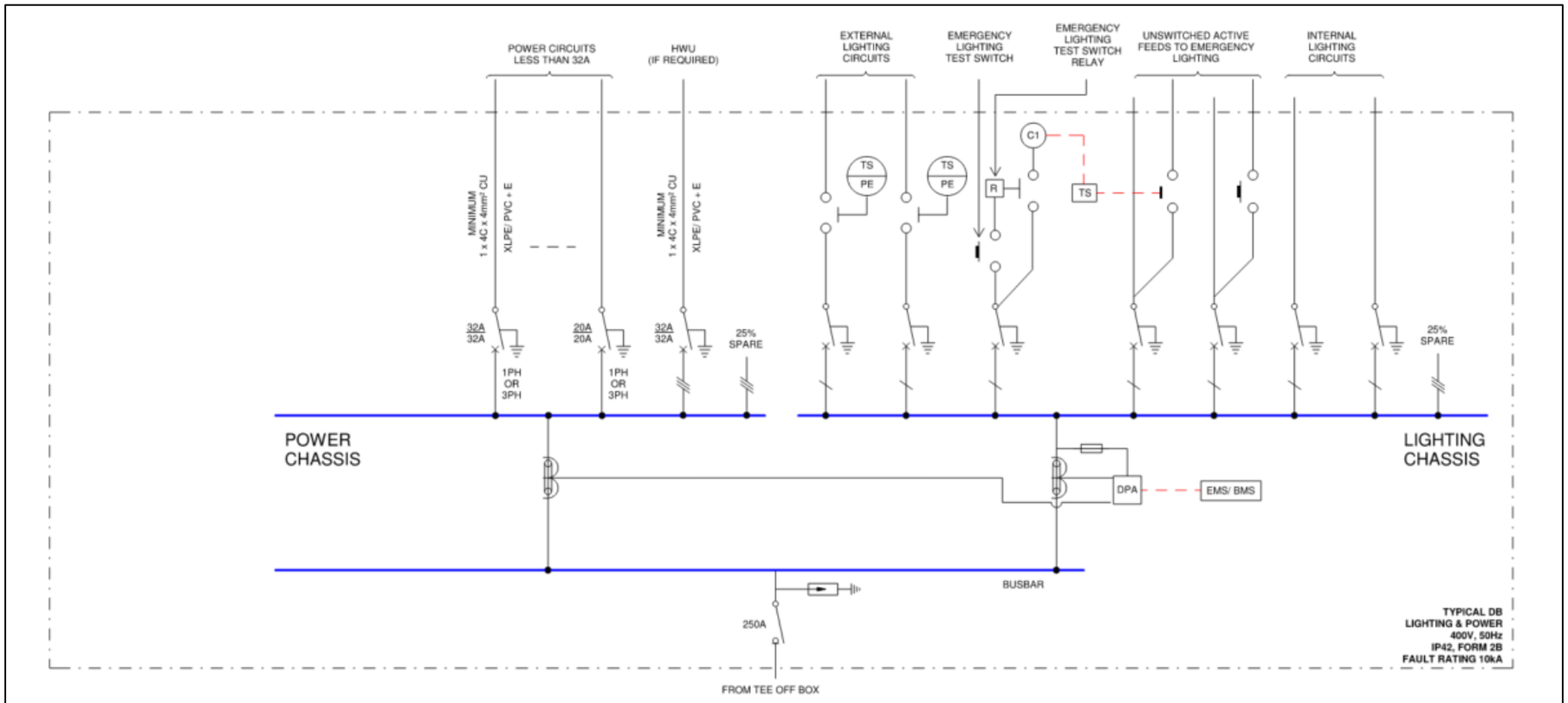
### Block L Ground Floor

The ground and lower ground electrical cupboards will be located in the building cores and ventilated using intumescent door grilles at high level to prevent heat and moisture build up. These Electrical cupboard will each include one EDB and one tee-off box. The EDB will include separate sections for power and lighting as well as surge protection. These EDBs will supply spaces on their respective floor of the new buildings. The lower ground electrical cupboard will also facilitate MSSB submain cable entry to then reticulate to the mechanical plants.

### Block L Level 1 & Level 2

The level 1 and 2 electrical rooms will open to the internal movement area of the building core. The Level One and Two electrical rooms will be ventilated using mechanical ventilation to prevent heat and moisture build up. These electrical rooms will each house one EDB and one tee off box. Each EDB will include separate sections for power and lighting as well as surge protection. These EDBs will supply spaces on their respective floor of the new building.

# ELECTRICAL DISTRIBUTION PROPOSED NEW BUILDINGS –BLOCK M




**ELECTRICAL SCHEMATIC:** TYPICAL ARRANGEMENT OF BLOCK M ELECTRICAL DISTRIBUTION BOARDS

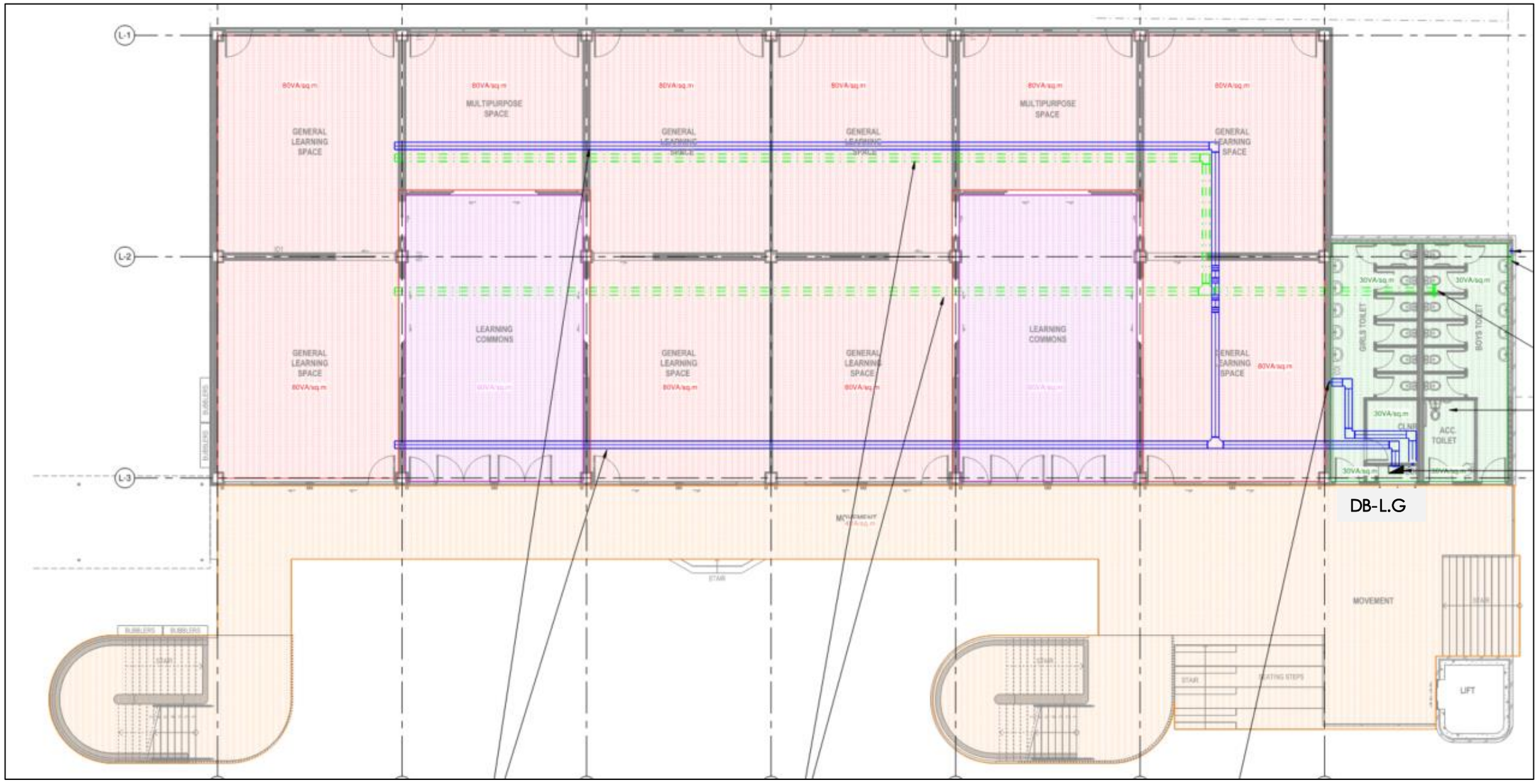
The proposed new building, Block M, will include Electrical Distribution Boards (EDB) contained in appropriately designed cupboards or rooms located within the building's core. These cupboards/rooms will be 60-minute fire rated, and smoke sealed.

### Block M Lower Ground

The ground and lower ground electrical cupboards will be located in the building cores and ventilated using intumescent door grilles at high level to prevent heat and moisture build up. These Electrical cupboard will each include one EDB and one tee-off box. The EDB will include separate sections for power and lighting as well as surge protection. These EDBs will supply spaces on their respective floor of the new buildings. The lower ground electrical cupboard will also facilitate MSSB submain cable entry to then reticulate to the mechanical plants.

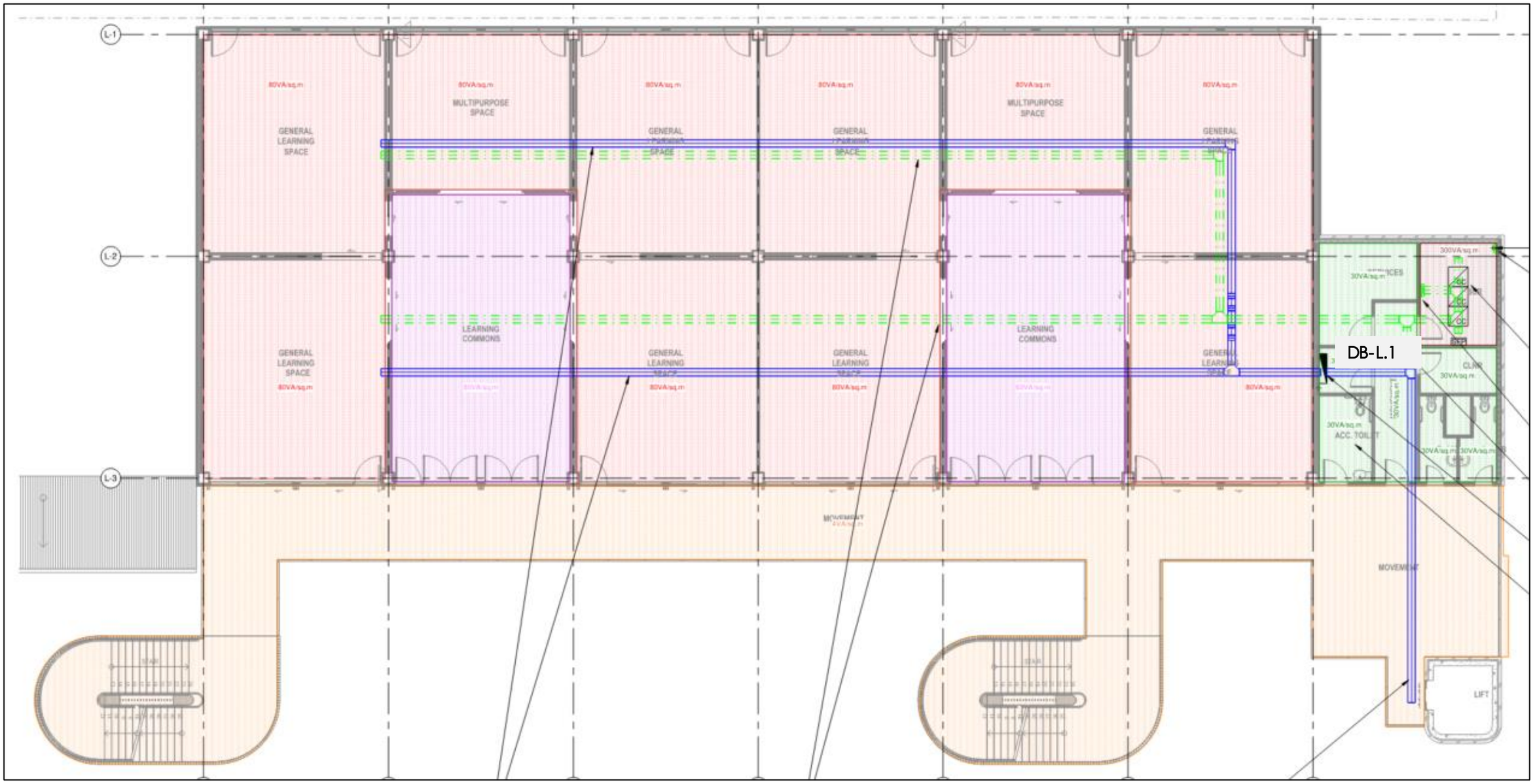
# POWER ARRANGEMENT – BLOCK L GROUND FLOOR

Cable tray to reticulate cabling from the ground floor EDB to other building spaces will be provided, with final reticulation to outlets achieved using catenary wire. Cable tray will be sized based on the final number of circuits required as per the DoE Patternbook and include spare capacity requirements in the EFSG for future additions. Cable tray will be reticulated within the ceiling void. Where cable tray is required in external area, removable covers will be affixed over the cabling.



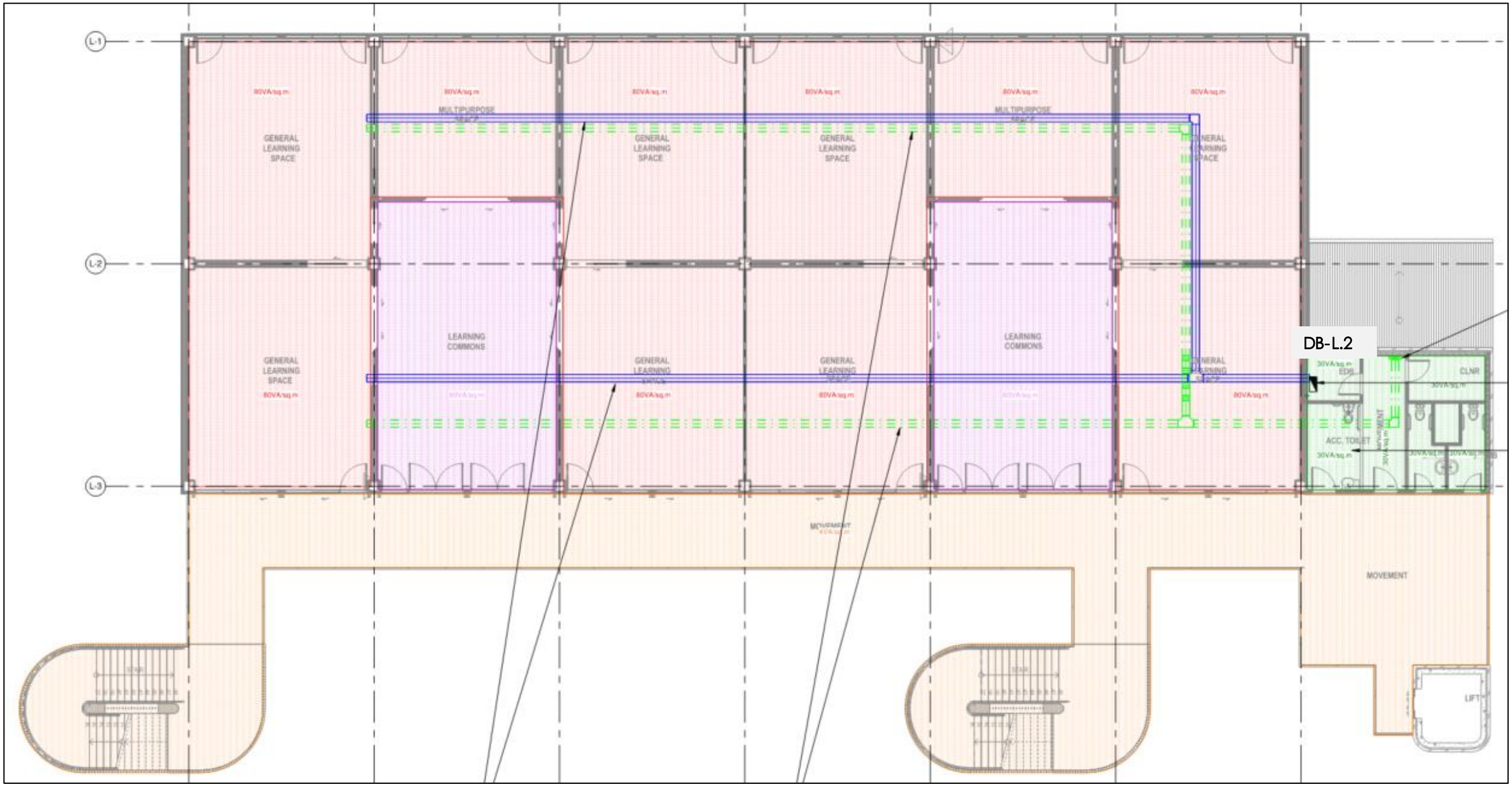
# POWER ARRANGEMENT – BLOCK L LEVEL 1

Cable tray to reticulate cabling from the ground floor EDB to other building spaces will be provided, with final reticulation to outlets achieved using catenary wire. Cable tray is also to be provided for submains to other boards including lift control boards. Cable tray will be sized based on the final number of circuits required as per the DoE Patternbook and include spare capacity requirements in the EFSG for future additions. Cable tray will be reticulated within the ceiling void. Where cable tray is required in external area, removable covers will be affixed over the cabling.



# POWER ARRANGEMENT – BLOCK L LEVEL 2

The level two cable reticulation strategy will be consistent with the ground floor strategy.



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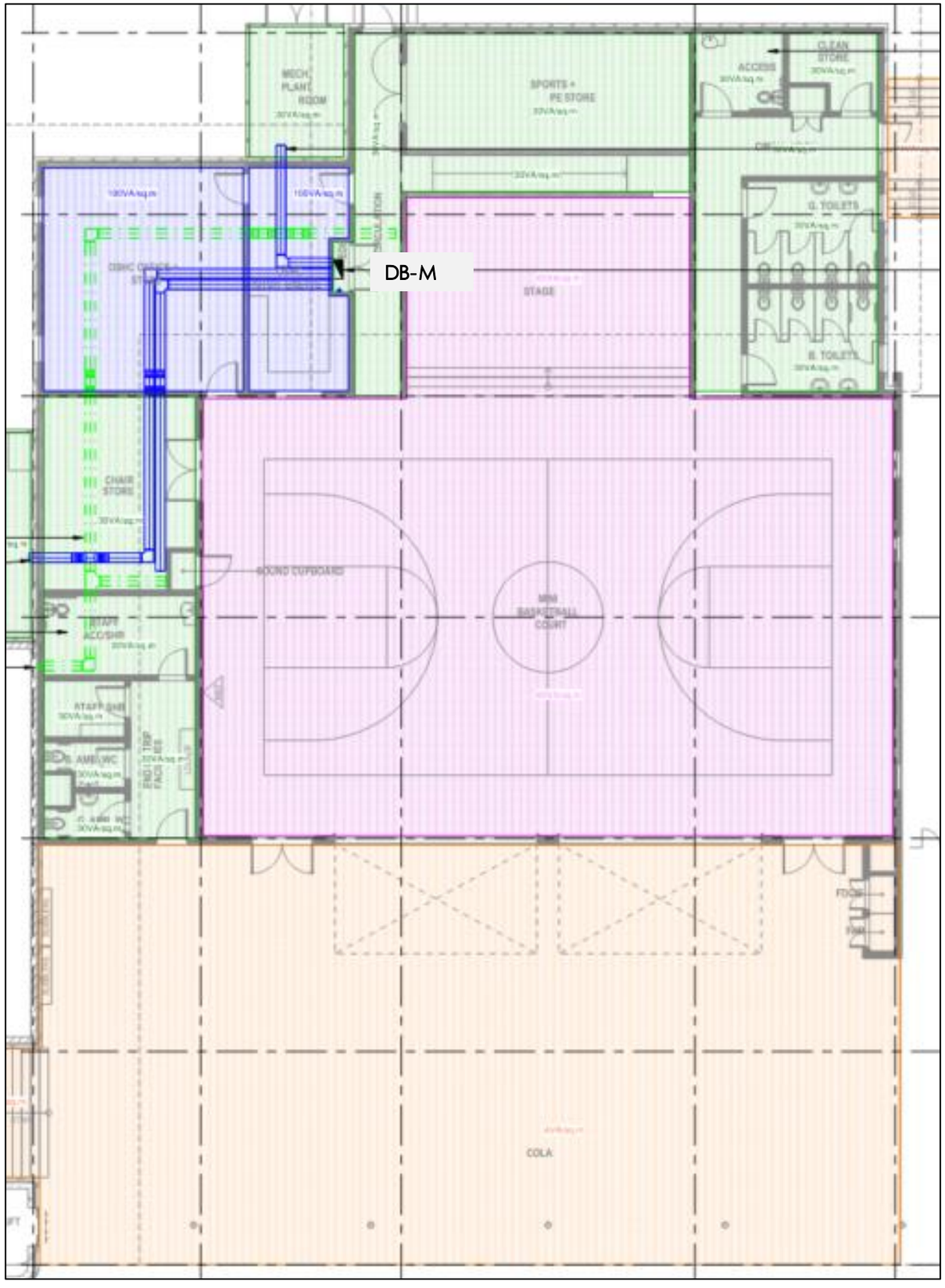
# POWER ARRANGEMENT – BLOCK M

Cable tray to reticulate cabling from the Block M EDB to other building spaces will be provided, with final reticulation to outlets achieved using catenary wire. Cable tray is also to be provided for submains to other boards including mechanical services boards. Cable tray will be sized based on the final number of circuits required as per the DoE Patternbook and include spare capacity requirements in the EFSG for future additions. Cable tray will be reticulated within the ceiling void. Where cable tray is required in external area, removable covers will be affixed over the cabling.



# POWER & COMMUNICATIONS OUTLETS

## INDICATIVE POWER AND TELECOMMUNICATIONS OUTLETS QUANTITIES BY LOCATION

| ROOM TYPE | ROOM QUANTITY | GPO | DGPO | DTO |
|---|---|---|---|---|
| ACC. AND AMB. WC | 3 | 1 | - | - |
| STAFF WC | 2 | 1 | 1 | - |
| STUDENT AMMENITIES | 2 | 3 | - | - |
| KITCHEN | 1 | 3 | 2 | 1 |
| DB CUPBOARDS | 1 | - | 1 | 1 |
| CHANGE ROOMS | 1 | 1 | 1 | - |
| OFFICE + STORE | 1 | - | 2 | 2 |
| CORRIDORS | 3 | 1 | - | - |
| MINI BASKET BALL COURT | 1 | - | 2 | - |
| STAGE | 1 | - | 2 | - |
| STORE ROOM | 3 | - | 1 | - |
| COLA | 1 | - | - | 1 |

| ROOM TYPE | ROOM QUANTITY | GPO | DGPO | DTO | CAPTIVE OUTLETS | STO |
|---|---|---|---|---|---|---|
| ACC. AND AMB. WC | 3 | 1 | - | - | - | - |
| CLEANER ROOMS | 1 | - | 1 | - | - | - |
| DB ROOMS | 1 | - | 1 | 1 | - | - |
| COORIDORS | 1 | 1 | - | - | - | - |
| BCR | 1 | - | 4 | 2 | 6 | - |
| LEARNING COMMONS | 2 | 1 | 4 | 4 | - | 2 |
| MULTIPURPOSE SPACE | 2 | 1 | 3 | 3 | - | - |
| GENERAL LEARNING SPACE | 8 | 3 | 4 | 3 | - | 2 |

The proposed electrical design includes power outlets, telecommunications outlets and ceiling fans. Indicative quantities have been provided for each area of the proposed new building to align with requirements of each space as documented in the existing EFSG. These quantities are to assist with tendering and for indicative pricing. Final quantities and design are to be based on the allowances as documented in the DoE Pattern book.

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# SOLAR ARRANGEMENT

Existing solar arrangement on site consists of a 6996W array located on the roof of Block K. The inverter station for this array is connected to distribution board DB-K.

As per EFSG V2, it is intended that a new PV system is sized to offset the power consumption of the proposed new building. In this instance the proposed development would need a 140kWp system. As this exceeds 99kW, a new 92kWp is the largest array size feasible which would bring the total site production to 99kWp.

Placement of the PV panels on Block L or M is not recommended due to extensive shading created from apartment buildings to the north. This considerable shading on the PV array in winter months will extend the payback period beyond the EFSG's 7-year requirement.

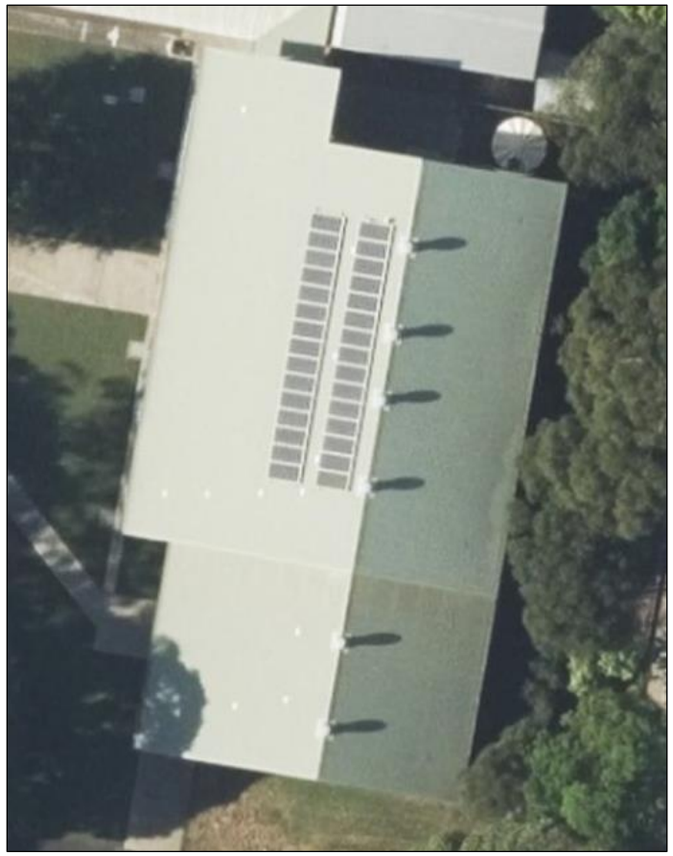
It is proposed the array be located on Block A due to the reduced shading factor and proximity to new MSB. The maximum array that can spatially fit on Block A is a 23kWp arrangement.

It is proposed 1x inverters will be located in Block A and connect to the new Main Switchboard. Final PV panel and inverter selection is to occur during detailed design in order to match system and site requirements. Inverter(s) shall be Fronius or SMA as per EFSG requirements.

New PV array to comply with all relevant Australian Standards, including AS4777, DNSP requirements, the EFSG (DoE 0933 Power Generation (Photovoltaic)) and NCC 2022. A mounting system is to provide a minimum 10 degree tilt to the PV panels to enable self-cleaning as per the EFSG. A roof penetration is to proposed to route DC cabling from rooftop solar PV array to 1x 25kw inverter.

Minimum 500mm clearance is provided around the perimeter of PV array and minimum 700mm gap every fourth row to create sufficient maintenance access pathways.

School system shall be retrofitted with central protection as sitewide inverter capacity will exceed 30kW. Central Protection device must have at minimum Vector Shift, Rate of Change Frequency and Phase Balance Current as per EFSG, DNSP requirements and AS4777.



Block K

Proposed arrangement on Block A

| Historical consumption of site | Building Area | Predicted power consumption | Size of proposed solar array | Payback period |
|---|---|---|---|---|
| 130Wh/sqm/day | 3800sqm | 495kWh/day | 23kWp | 3.2 - 4.5 years |

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# LIGHTING

## General

All lighting will comply with all relevant Australian Standards, including AS1680 and AS1158 recommended illumination levels, the EFSG, Patternbook and NCC 2022.

New LED luminaires will be provided for general lighting throughout the school. No specialist or feature lighting has been considered. Luminaires will be concealed and integrated within architectural details wherever possible to simplify the appearance of the ceiling and promote visual acuity. The lighting colour temperature to be used throughout the areas shall be 4000K unless noted otherwise.

Type of luminaires shall be coordinated with the Patternbook and EFSG, indicatively:

- LED panels and LED suspended linear luminaires shall be used in general areas, such as general learning classrooms, admin and staff and enclosed corridors where possible.
- LED downlights are to be used in common areas, corridors, amenities and cleaners' rooms.
- LED downlights and infrared heat lamps are to be used in accessible amenities.
- LED battens shall be used in storerooms, electrical cupboard, communications and all plant rooms.
- Weatherproof, vandal resistant LED troffers shall be provided for all external areas including COLA, stairs and external corridors.
- LED High Bay lighting shall be used within Hall area.
- Stage Lighting as per EFSG and Patternbook requirements

## Emergency & Exit

Emergency luminaires and exit signs are to be provided in accordance with the NCC and AS/NZS 2293.1-2018. An emergency lighting test switch is to be provided at each EDB.

## Control

Lighting in the new building is to be controlled via a programmable and addressable DALI based lighting control system such as Dynalite or KNX. All luminaires are to be DALI dimmable.

An indicative lighting control strategy is:

- Internal luminaires shall be controlled via motion sensors and switch plates with timer shutoff.
- External luminaires shall be controlled via motion sensors and photocells with timer shutoff.

Internal areas such as general learning spaces shall offer dimming and scene-setting where appropriate.

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# LIGHTING – BLOCK L GROUND

## LIGHTING DESIGN LEGEND

80 LUX AVERAGE HORIZONTAL ILLUMINANCE AS PER EFSG AND AS/NZ AS1680.2.1-2008 TABLE D1
UGR AS PER EFSG AND AS/NZS AS1680.1-2006 TABLE 8.2
LIGHTING UNIFORMITY AS PER EFSGH AND AS/NZS AS1680.1-2006 TABLE 3.2

160 LUX AVERAGE HORIZONTAL ILLUMINANCE AS PER EFSG AND AS/NZ AS1680.2.1-2008 TABLE D1
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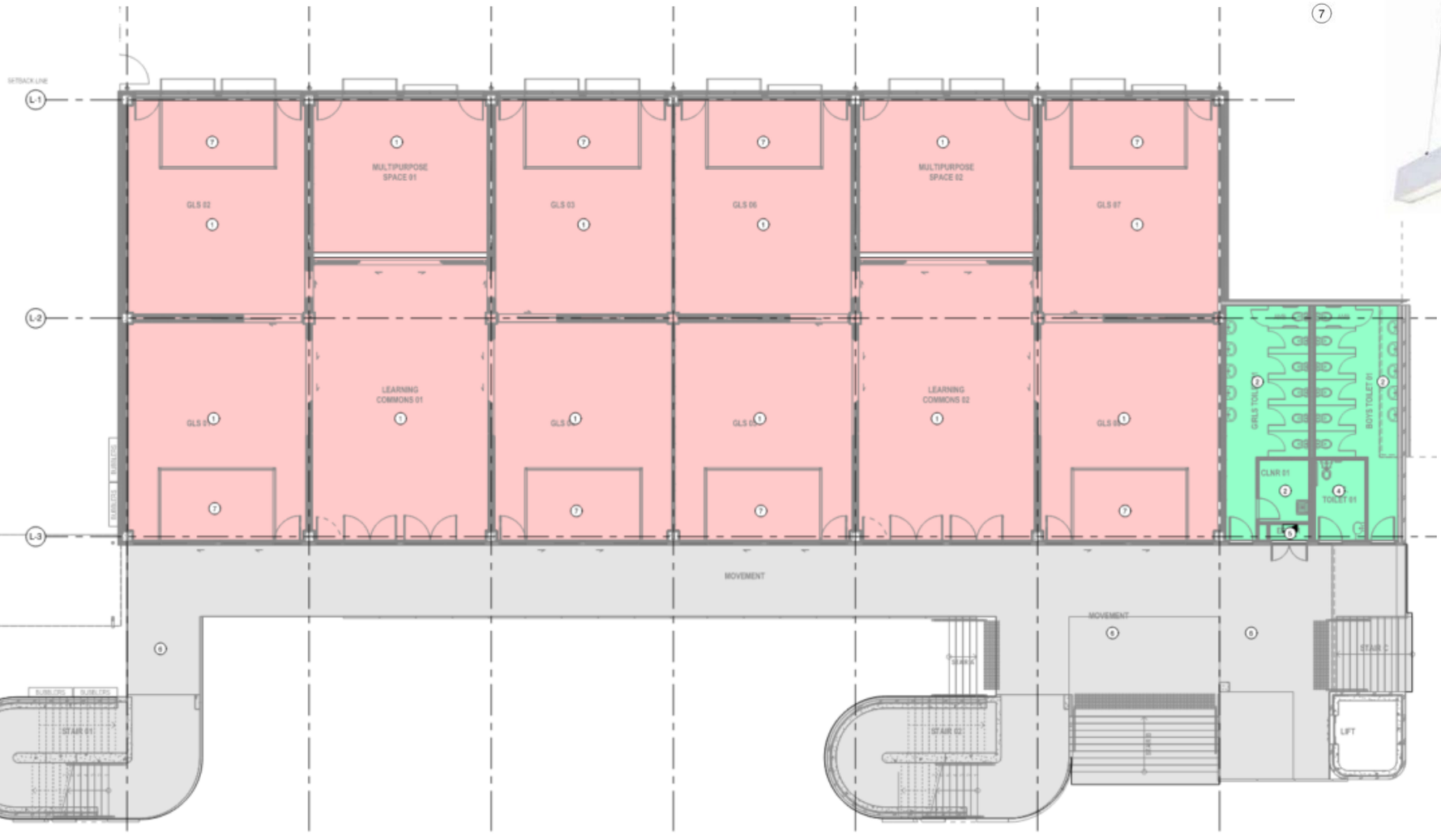

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# LIGHTING – BLOCK L LEVEL ONE

## LIGHTING DESIGN LEGEND

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LIGHTING UNIFORMITY AS PER EFSGH AND AS/NZS AS1680.1-2006 TABLE 3.2

400 LUX AVERAGE HORIZONTAL ILLUMINANCE AS PER EFSG AND AS/NZ AS1680.2.1-2008 TABLE D1
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LIGHTING UNIFORMITY AS PER EFSGH AND AS/NZS AS1680.1-2006 TABLE 3.2

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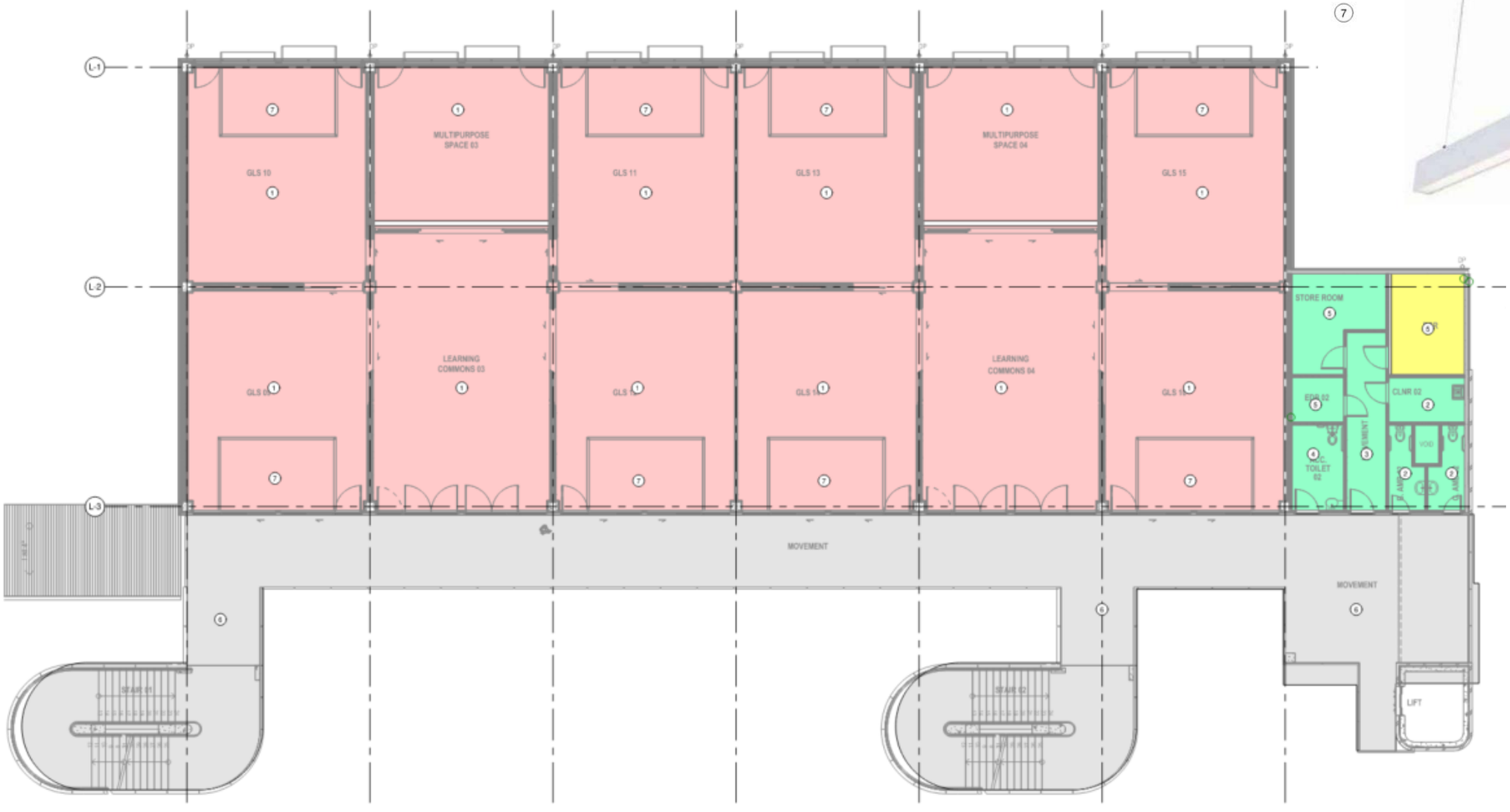

Electrical Services

# LIGHTING – BLOCK L LEVEL TWO

## LIGHTING DESIGN LEGEND

80 LUX AVERAGE HORIZONTAL ILLUMINANCE AS PER EFSG AND AS/NZ AS1680.2.1-2008 TABLE D1
UGR AS PER EFSG AND AS/NZS AS1680.1-2006 TABLE 8.2
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160 LUX AVERAGE HORIZONTAL ILLUMINANCE AS PER EFSG AND AS/NZ AS1680.2.1-2008 TABLE D1
UGR AS PER EFSG AND AS/NZS AS1680.1-2006 TABLE 8.2
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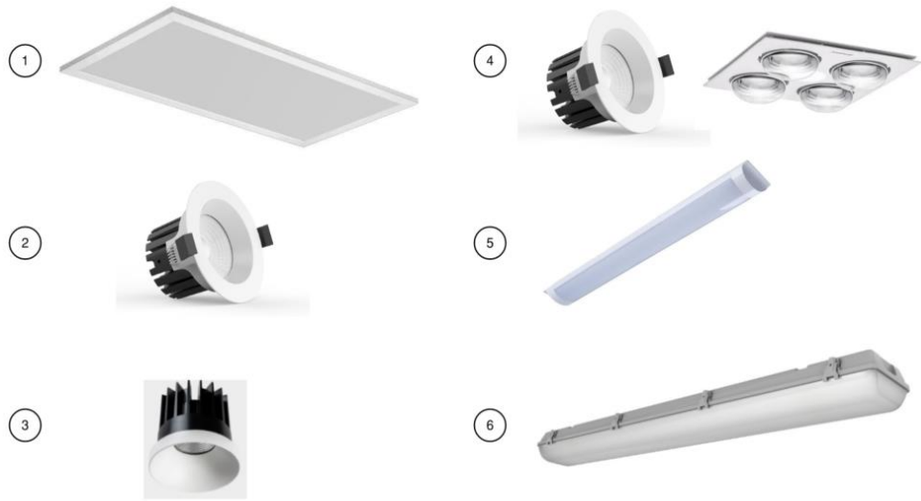


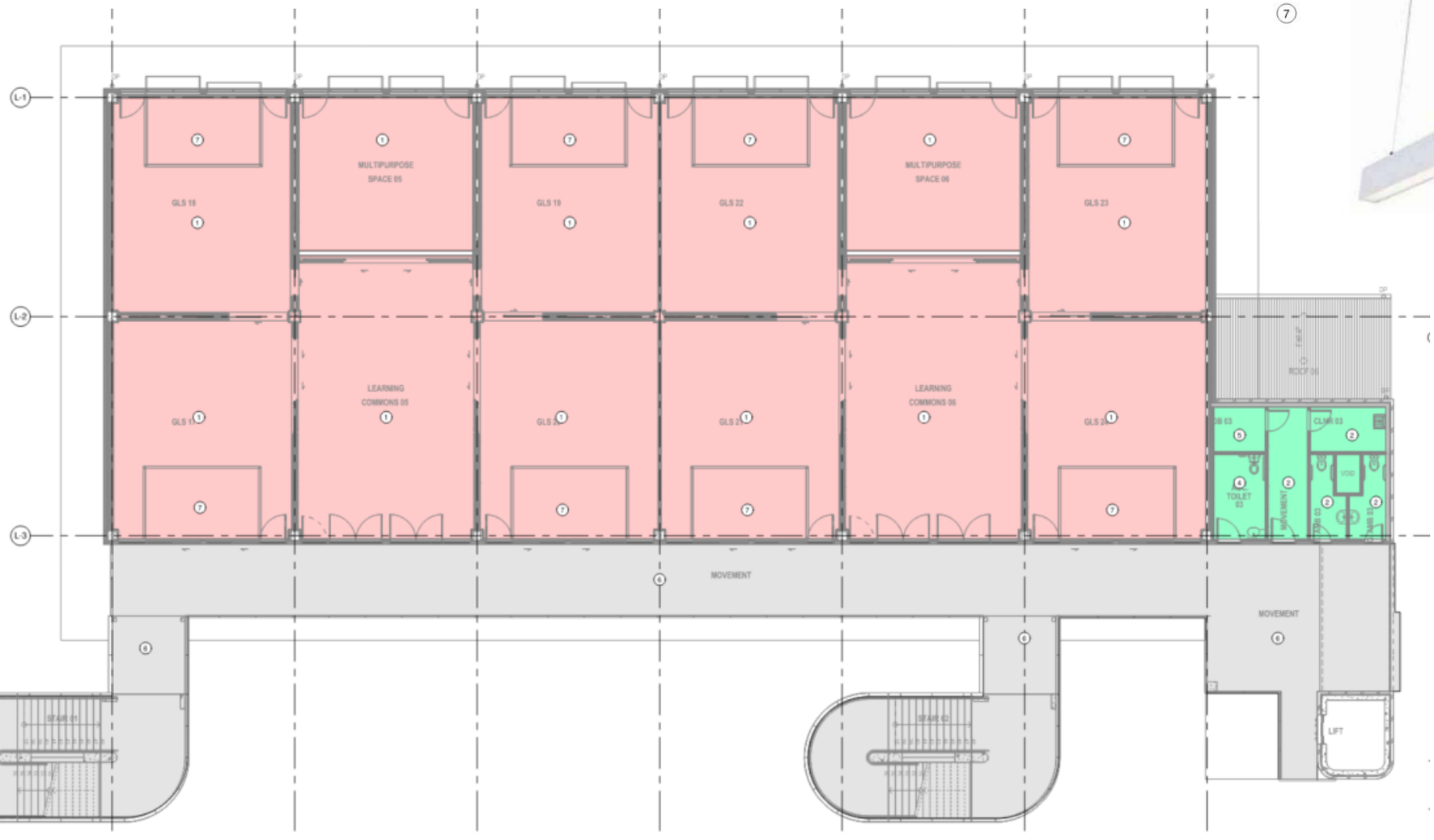

# LIGHTING – BLOCK M LOWER GROUND

## LIGHTING DESIGN LEGEND

80 LUX AVERAGE HORIZONTAL ILLUMINANCE AS PER EFSG AND AS/NZ AS1680.2.1-2008 TABLE D1
UGR AS PER EFSG AND AS/NZS AS1680.1-2006 TABLE 8.2
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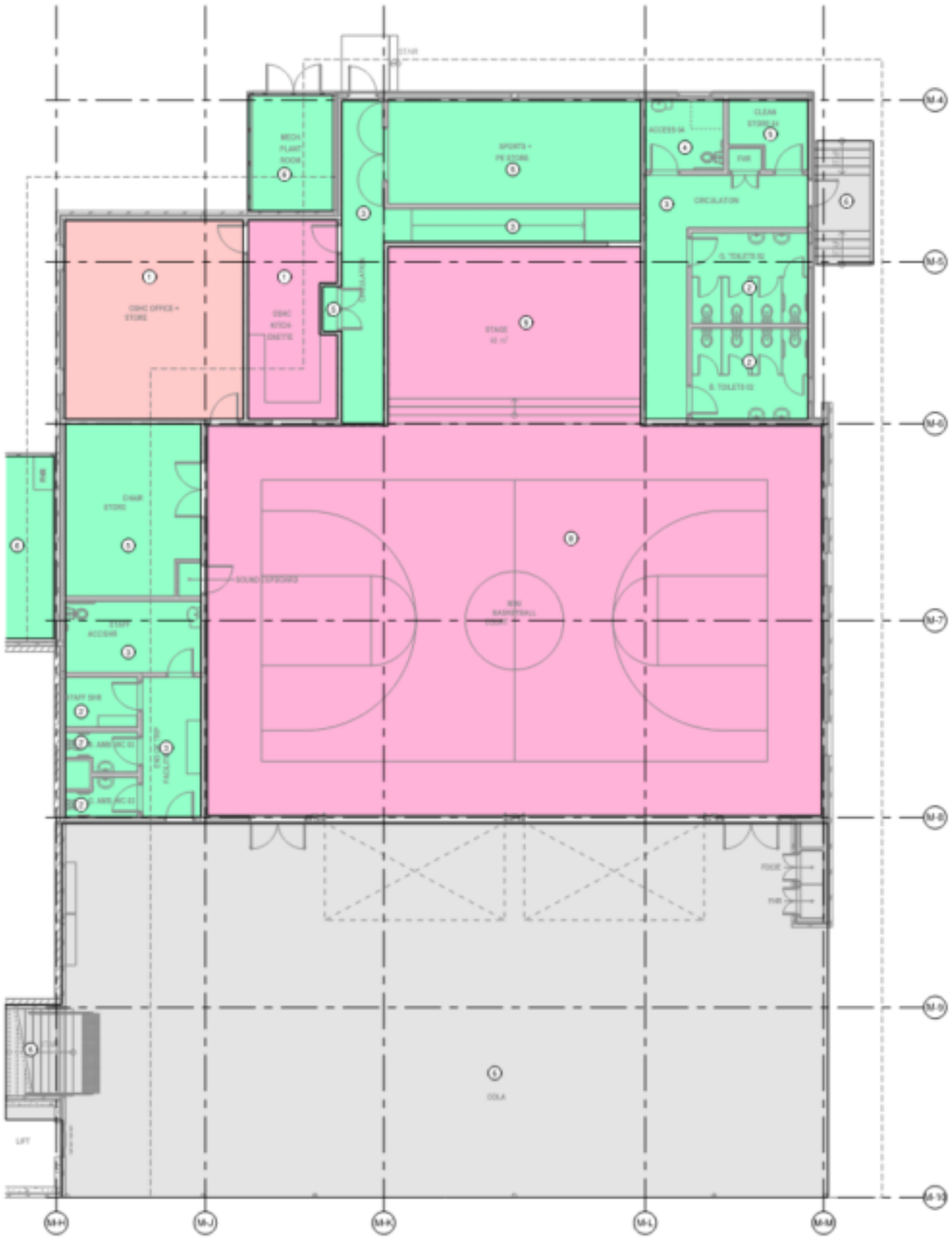
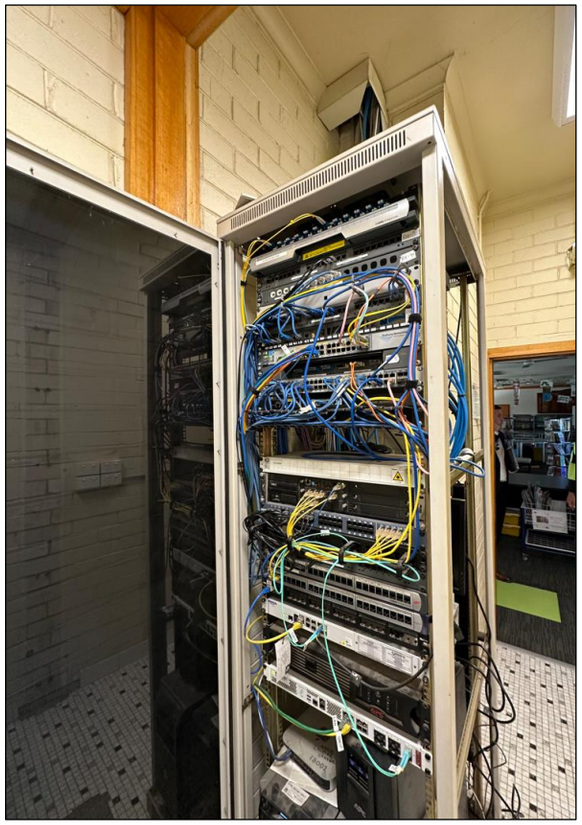


Electrical Services

# COMMUNICATIONS NETWORK



## Existing

Kogarah Public School is currently served by the NBN network. The network technology used in Fibre to the Curb (FTTC). The NBN Network Termination Device (NTD) is located in the main switchroom. The campus distributor is located on Level 1 of building A in a tiled bathroom. The existing MCR consists of one rack. The school currently uses fibre as backbones between the main distribution cabinet and the other buildings.

The one cabinet is quite full and would likely not support additional backbone cabling to the proposed new buildings. The existing communications room is also not EFSG compliant in many ways.

The communications backbones utilise a network of pits and conduits to reticulate around the school. The main reticulation pathway is from the library building across the central courtyard. The spare capacity of this conduit network could not be determined.

## Proposed

It is proposed the existing main communications room is modified to accommodate a second communications cabinet to serve the existing and new school spaces.

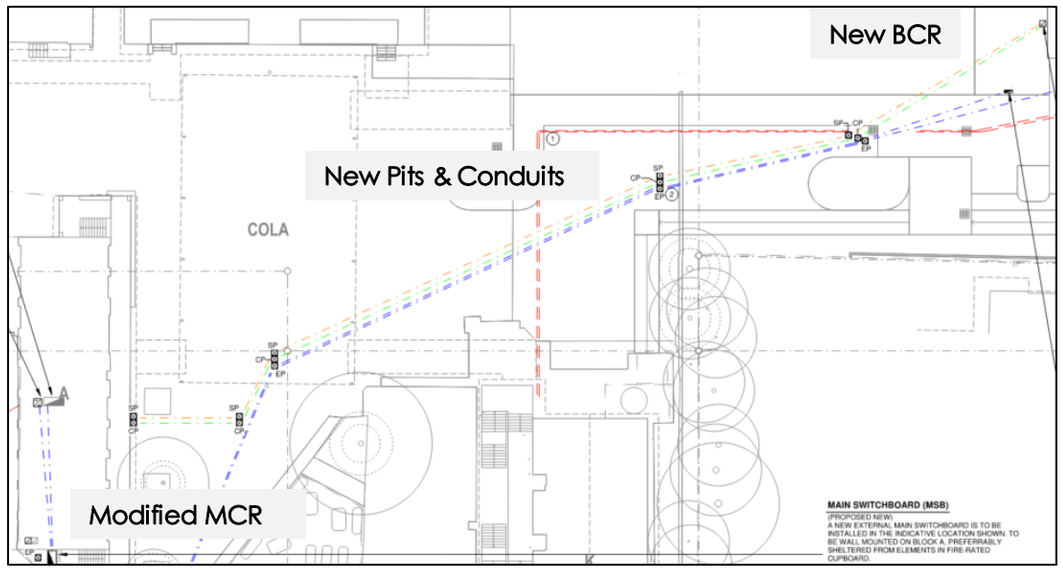
New buildings will be supported via a new communications room. The new Building Communications Room (BCR) will be located on level 1 of Building L and have dimensions 4.0m x 3.0m consisting of three communications racks and security field panel.

The new BCR on will serve:

- Building L – Ground Floor
- Building L – Level One
- Building L – Level Two
- Building M – Lower Ground Floor

The new BCR will be connected via 12 Core OS2 fibre back bone to the existing main communications room in the Block A library. New trenching route shown has been coordinated with other services reticulation to the new building. Within new building optical fibre conduit to be embedded in building fabric to reticulate to BCR.

The existing pit and conduit network will need to be expanded and extended to allow for the new cable pathway to the new buildings.



# PROPOSED COMMUNICATIONS, AV & SECURITY

## Site Communications Upgrades

Site MCR to be modified and new additional cabinet to be provided. Switches from Block A Ground floor cabinet to be relocated to modified MCR.

The existing 27RU rack supplying blocks B/C is to be floor mounted.

Existing WAPS and switches to be replaced as per ICT Audit.

## Telephony

The existing PABX telephony system shall be replaced with new TIPT system. Outlets for phone connections and handsets within each GLS of the new building and two in the Hall are to be provided.

## PA

The existing Numark PA system on site is to be expanded to suit the new building. New speakers, interconnecting cabling and amplifiers are to be provided. Confirmation on the suitability of this proposed expansion is pending.

## AV

The final AV design shall be completed by the contractor is consultation with the EFSG and Pattern Book.

Indicatively, this will involve:

- Interactive Learning Displays
- Mounting Hardware/ Mobile Trolleys
- Portable Hearing Augmentation

## Security

A new Security Field Panel (SFP) is to be provided within the new BCR in Block L. New RS-485 LAN cabling is to be extended from the MCR to the new BCR in a star topology.

Indicatively, this will involve:

- PIR sensors throughout all new rooms.
- All perimeter doors leading will have reed switches to monitor door status.
- All electrical cupboards will be lockable with a master PWD “E” key.
- A sounder/screamer within each floor.

The final security design shall be based on the SSU brief.

### Video Security

A video security system shall be provided as per the SSU Brief. Indicatively this will involve:

- Minimum 6MP POE Camera
- NVR upgrades to enable recording for 42 days at 20 frames per second.
- Cat6A cabling.

# MCR WORKS

Existing site MCR is to be modified and existing cabinet to be repositioned within room. New additional 45RU 1000 x 800mm cabinet to be provided.

Switches from Block A Ground floor cabinet to be relocated to modified MCR. Cabling from the redundant rack is to be replaced and cabled back to the MCR.

Departures are required from DoE Structured Cabling Specifications, including:

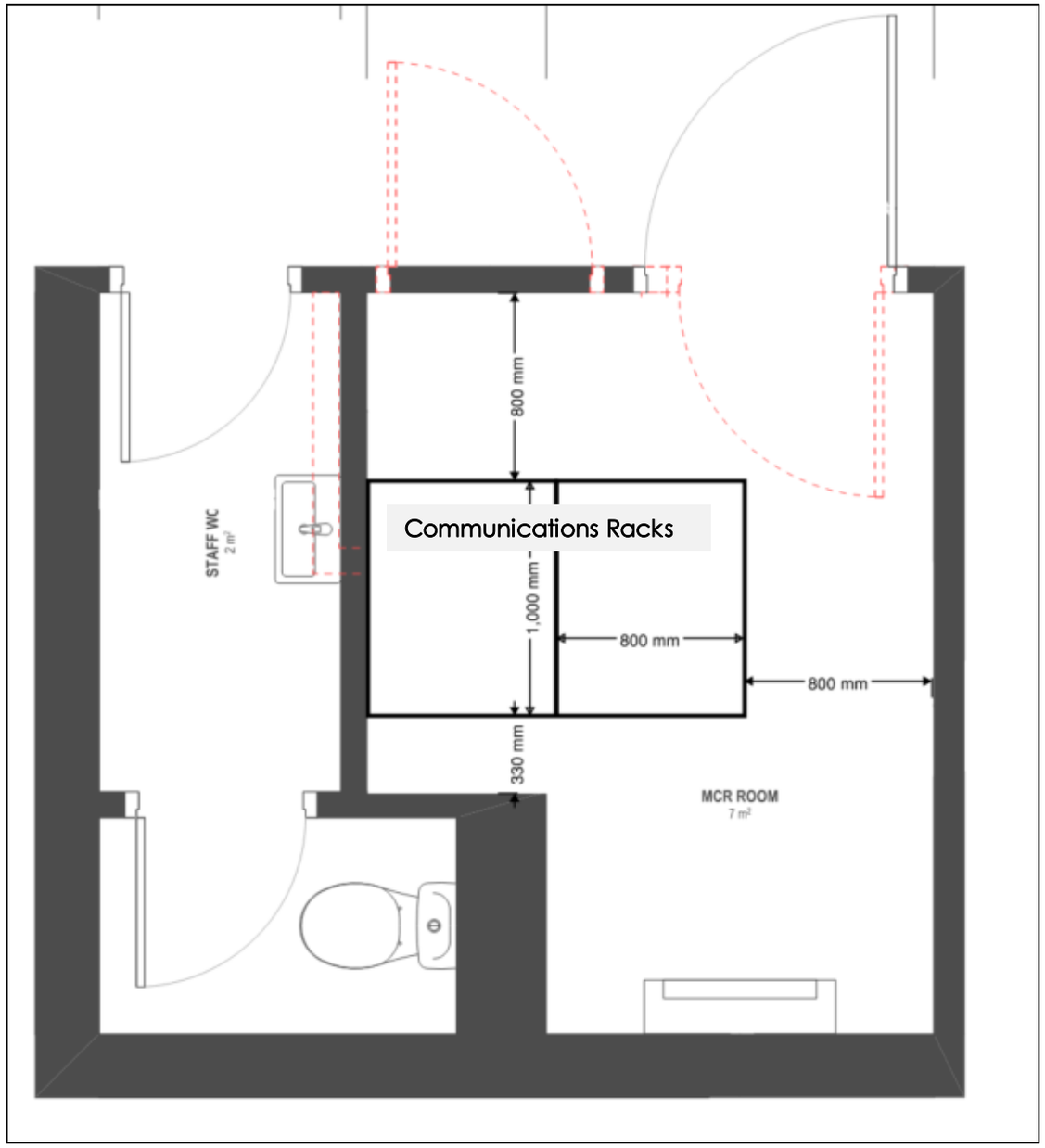
- MCR is less than 15.5sqm

- Minimum 900mm clearances behind and to the side of cabinets are not achieved

- Minimum 1200mm clearance in front is not achieved

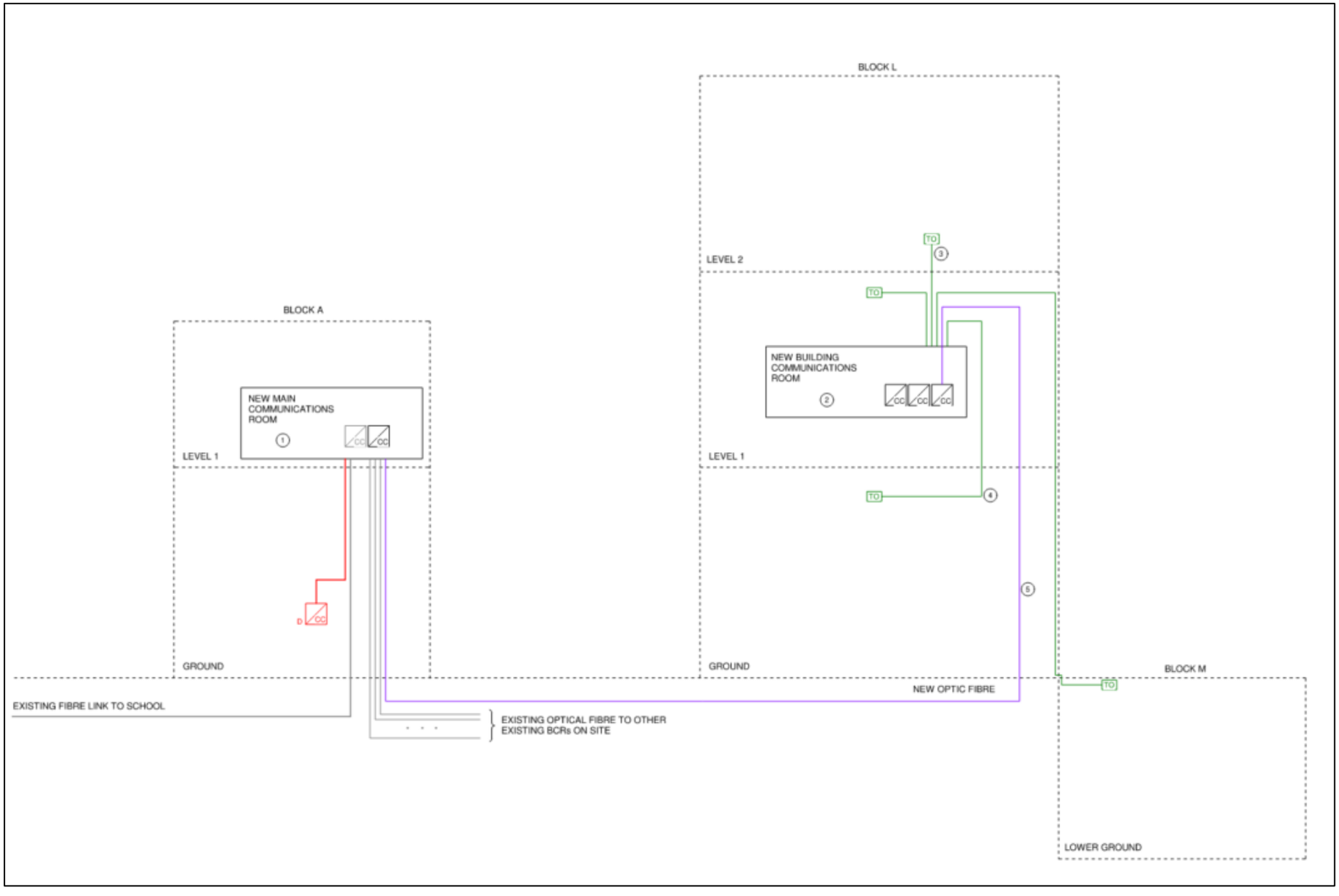
However, sufficient space exists in front, behind and on side of cabinets for maintenance.

Room to be split system air conditioned.




Main Communications Room

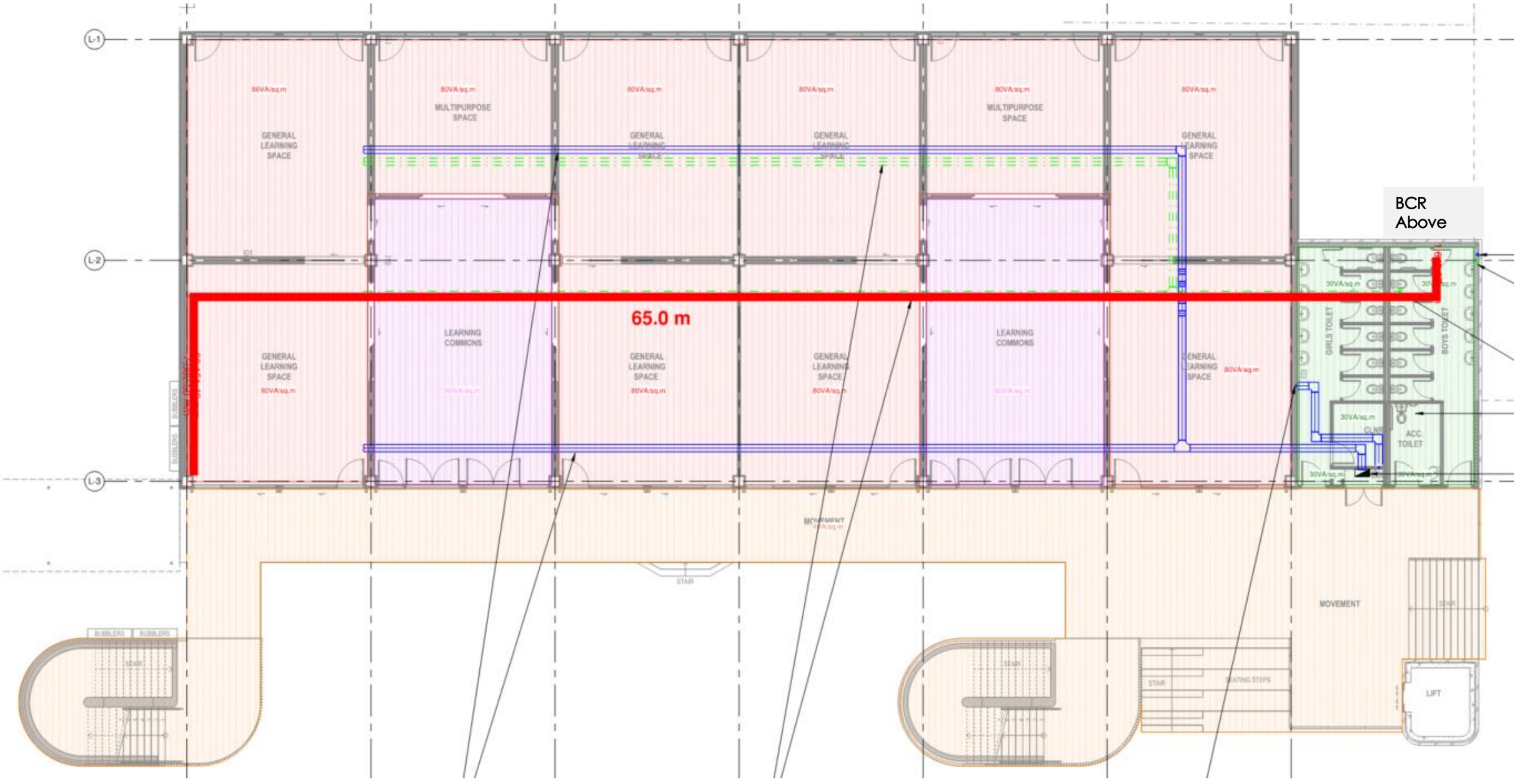
# COMMUNICATIONS NETWORK




Kogarah Public School Communications Schematic

# COMMUNICATIONS NETWORK

The placement of the new BCR is such that the maximum length of horizontal structured cabling is less than 75m as per the ESFG.



# RISKS & OPPORTUNITIES

## Pattern Book Development and Release

The school infrastructure pattern book is currently being developed with portions released to date. The current designs have been based on the available sections of the pattern book, with the existing EFSG utilised where the relevant sections of the pattern book have not yet been released. Subsequent issue of the pattern book may result in the current designs varying from requirements documented in the pattern book.  This may result in further design work being required if the plans are to be updated to the new requirements.

## Spare Capacity of Existing Electrical & Communications Reticulation System

The electrical and communications reticulation system includes existing conduit in the vicinity of the proposed new works including the proposed new main switchboard and proposed new building. The site utility survey indicated the presence of spare capacity in the existing communication and security conduits near the proposed new building. Use of this existing conduit will reduce the disruption and damage to landscaping that results from trenching for the installation of new conduit as well as reducing project costs. Further investigation of the existing conduits will be required to confirm the viability of this spare capacity and may include a camera inspection of the conduits to ensure these pathways meet the current Structured Cabling System Specification.

## Solar PV Array

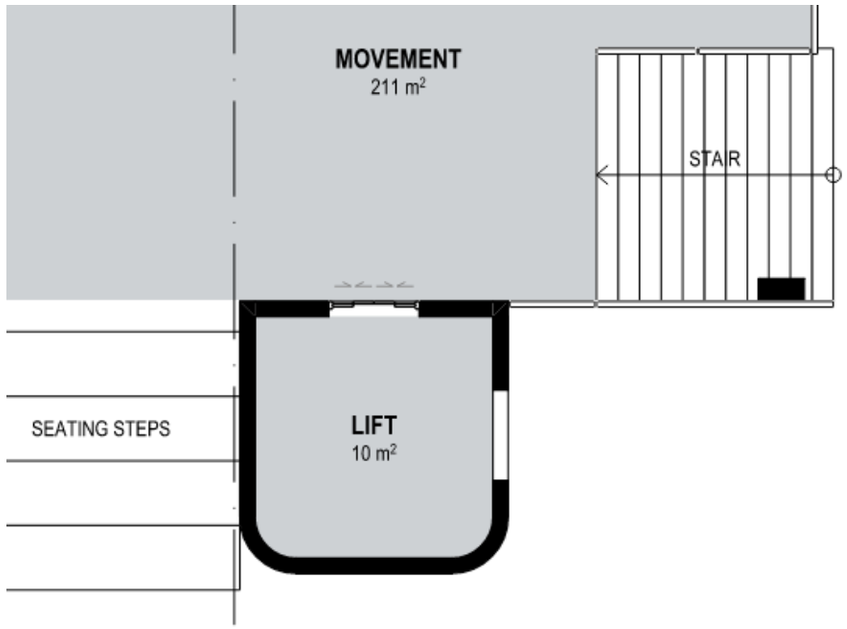
Due to the extensive shading issues near Block L & M, it is proposed to install the new Solar PV system on the roof of Block A. Furthermore, a structural review is being undertaken to confirm  the exact area available on Block A that can support the proposed load of the panels and mounting hardware.

## Trenching Site Constraints

Trenching for services within the site and the existing school is required to comply with the mitigation measures and methodology included in the latest Archaeological and Heritage assessment report by Jacobs. The contractor will need to program and co-ordinate trenching and services installations in the existing school so that school operations are not disrupted, noting these activities could be extended due to the mitigation measures.

Electrical Services

# VERTICAL TRANSPORTATION




### Applicable Standards & Guidelines

The services concepts have been developed on the basis of the following:

- NCC 2022
- EFSG v1 & 2
- AS1735
- AS3000
- WH&S Act
- NSW Department of Education Patternbook

### Certification

Self-Certification of the completed Vertical Transportation installations shall be provided by the equipment installer to confirm the installation has been supplied and installed in compliance with the above listed codes and standards, and to certify that each installation has been tested and commissioned and is 'safe to operate'.

Lift services scope will be provided as outlined below and consist of one (1) lift as follows:
- one (1) passenger lift for the proposed new classroom building

| Details | Passenger Lift No.1 |
|---|---|
| No. of Lifts | One |
| Service Classification | Passenger |
| Rated Load | 1350kg – 18 Passengers |
| Rated Speed | 1.0 m/s |
| Machine Type | Machine roomless (MRL) traction drive |
| Levels Served | 3 Levels & 4 openings – Ground (front and side), Level 1 (front), Level 2 (front) |
| Liftwell Enclosure | Conventional solid enclosure to NSW Department of Education Patternbook requirements |
| Liftwell Dimensions | 2600 wide x 2600 deep (clear internal - ensuring curved rear wall of liftwell does not impede lift) |
| Entrance Type | Corner car arrangement two entrances – 2 panel center opening type (1000 x 2100) and 2 panel side opening type (1000 x 2100) finished in stainless steel |
| Approximate Travel | 7500mm |
| Liftwell Headroom | 4500mm |
| Liftwell Pit Depth | 1500mm |
| Control System | Conventional |
| Lift Car dimesnions | 1500 wide x 2000 deep clear internal |
| Counterweight Safety Gear | Not required – no accessible space below pit |
| Counterweight Location | Side |
| BMS Interface | Required |
| ESD | Drive System to be VVVF<br>Regenerative braking<br>LED lighting<br>Automatic isolation of lighting and all ancillary components |
| Acoustic | Noise level of 55dBa max inside |
| Special Requirements | Corner car arrangement.<br>Increased liftwell plan to allow for accessible requirements for side entrance.<br>Lift well must be kept below 40°C at all times when lift is in service.<br>Minimum 10mm2 earth cable.<br>3rd party supply buttons.<br>Automatic rescue device.<br>Shutdown lighting and all ancillary components<br>Access Control in lift car and on landings.<br>CCTV Camera in lift car.<br>Lift lobby depth approx. 1.5x lift car depth, i.e. 3000mm to accommodate stretcher and goods (including furniture),<br>Lift maintenance control panel adjacent doors on top level served. |

NDY
A TETRA TECH COMPANY

# MECHANICAL SERVICES

Mechanical Services

# CLIMATIC CONDITION & DESIGN CRITERIA

# KOGARAH PUBLIC SCHOOL

**Ambient condition:**
- Summer: 32.8°C DB, 22.6°C WB
- Winter: 6.3°C

(temperatures based on Sydney airport in January, closest weather station)

**No bushfire risk**

**Internal design condition for <u>new</u> buildings** per EFSG DG 55.02:
- Cooling: 24 ~25.5 °C
- Heating: 19.5 ~ 21°C

**Occupancy density**:
- 2 sqm/person in accordance with EFSG for GLS
- 10 sqm/person for office / admin spaces in accordance with AS 1668.2

**Internal equipment gains**: 30 W/person, which allows for 1 laptop/person

**Lighting heat gains**: 4.5 W/m2 in accordance with NCC 2022

**Fresh air provision:**
- 12 L/s/person in classrooms
- 11.25 L/s/person in staff spaces

This meets 50% above AS 1668.2 requirements for Greenstar indoor air quality point, provided that high efficiency filter is provided.

# AIR-CONDITIONING PROVISION REQUIREMENT

The following is noted from the SINSW Design Guidelines 55 on the provision of air conditioning:

| Avg Mean Max Jan Temperature | New/Major Upgrade/Redevelopments Areas |
|---|---|
| ≥33°C | **Provide to permanent learning spaces, staff, and administration areas.** |
| <33°C | **Provide to permanent learning spaces and libraries only.** Administration and staff areas to be conditioned ONLY when included in the project upgrade scope and inclusion is required to achieve compliance with the relevant standards. When not included, school can source their own fundings |

| Avg Mean Max Jan Temperature | Existing Areas |
|---|---|
| ≥33°C | **Provide to permanent learning spaces and libraries only.** Admin and staff areas sourced by school own funding only. |
| ≥30°C | **Provide to permanent learning spaces and libraries only.** No requirement for admin and staff areas |
| <30°C | **Schools may apply to SINSW for A/C to be installed in permanent learning spaces and libraries** |

As Kogarah Public School is 32.8 C, which is <33°C but more than 30° C isotherm, AC is required to be provided to the followings per the EFSG:

- New Building: learning spaces, admin/staff offices, and communications rooms
- Existing Building: learning spaces and libraries only

EFSG Cooler Classroom Program (CCP) Guideline defines the followings existing spaces as learning spaces:

| Primary School | Secondary Schools |
|---|---|
| Home Base HB and associated Practical Activity Areas PAA (normally one space). Where separated by wall, PAA requires separate A/C | General Learning Spaces |
| Libraries and associated areas (reading, study, seminar rooms), provided the area is >17sqm. No A/C, fresh air, or controls for spaces <17sqm | |
| Withdrawal rooms (generally shared with Home Base and will share A/C and fresh air system with HB via vents/louvres or opening the door, unless separated and larger than 17sqm). | Practical rooms, including laboratories, kitchens & hospitality spaces, and performance and fitness workshops (but not gyms.) |

| Not Considered as Learning Spaces per CCP Guideline |
|---|
| • Preparation rooms (food & science)<br>• Library workrooms and library offices<br>• Storerooms<br>• Any eligible rooms <15 sqm adjacent to air-conditioned space<br>• Any room with open or meshed walls<br>• Workshops<br>• Hot metal area<br>• Tin sheds<br>• Craft room (if not learning space or PAA)<br>• Seminar rooms (which are not part of library)<br>• Study spaces<br>• Darkrooms<br>• Any spaces not used for learning by students |

# Kogarah Public School

# Existing Site Plan and Existing A/C Provision

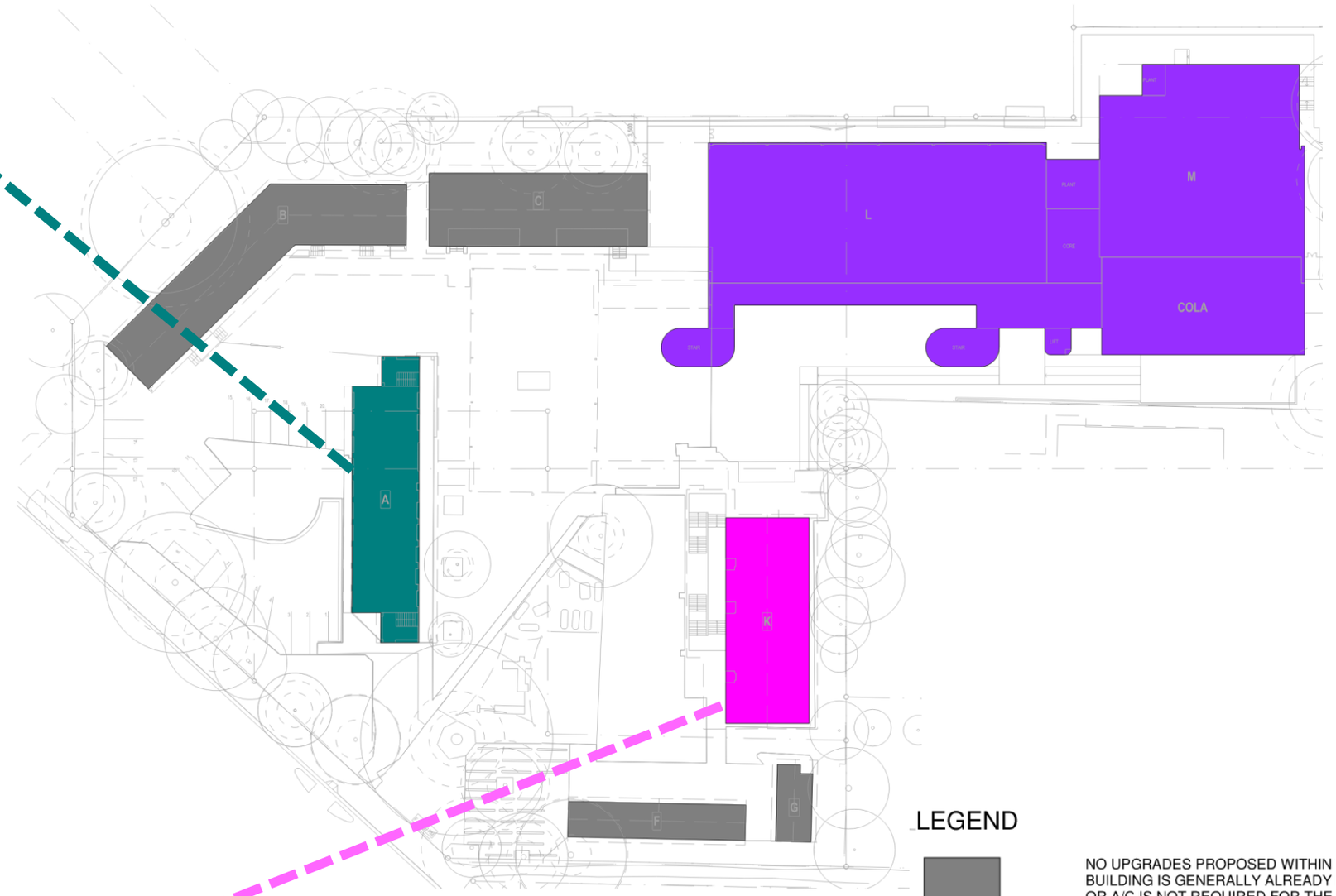
Block A Level 1 is proposed to have a new Main Communication Room (MCR).

It is proposed that the new MCR will be provided with air-conditioning and mechanical ventilation.


Several learning spaces are un-conditioned or provided only with portable A/C in Building K.

It is proposed that all five (5) learning spaces in Building K are provided with permanent A/C, in accordance with EFSG Cooler Classroom Program (CCP).

Scope and requirements are TBD by SINSW




LEGEND

NO UPGRADES PROPOSED WITHIN THE BLOCK. BUILDING IS GENERALLY ALREADY PROVIDED WITH A/C OR A/C IS NOT REQUIRED FOR THE SPACES AS PER EFSG COOLER CLASSROOM PROGRAMS

UPGRADES WORKS PROPOSED WITHIN THE EXISTING BLOCK. REFER TO ASSOCIATED DRAWINGS OF THE BLOCK FOR FURTHER DETAILS

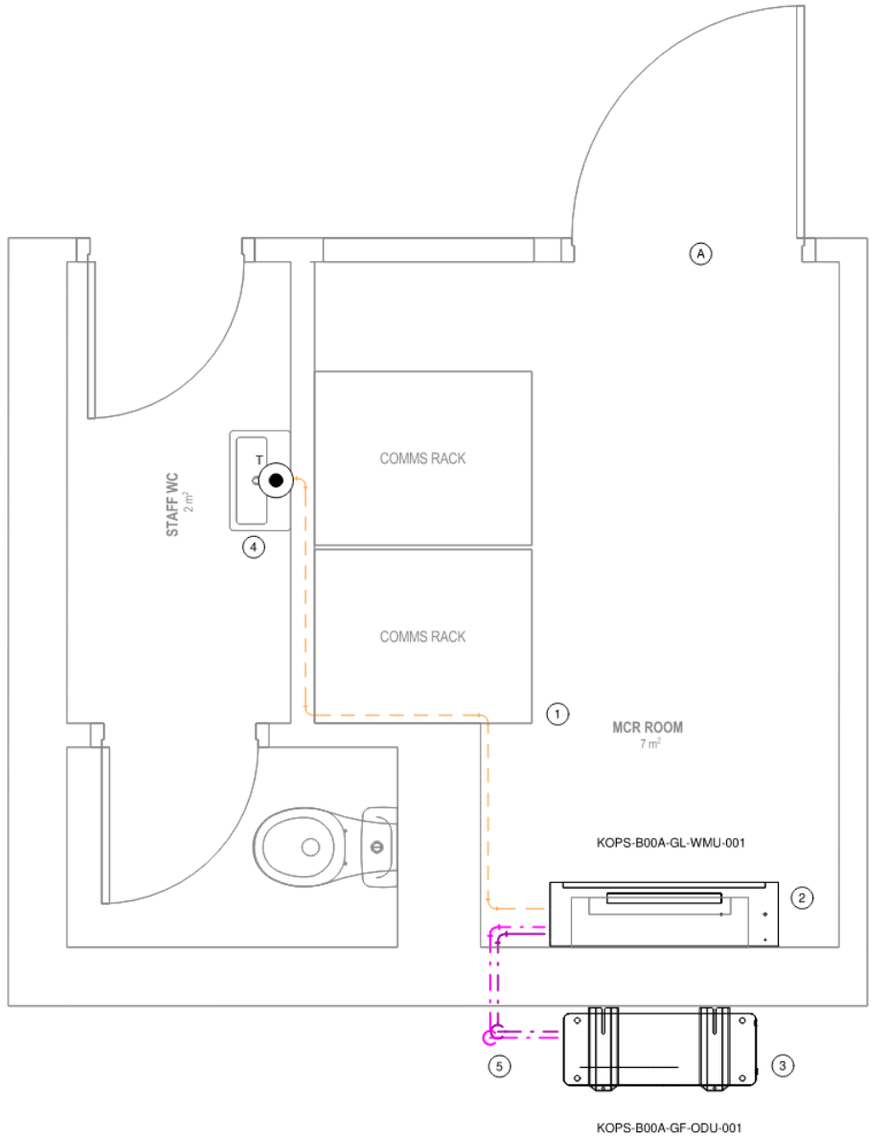
NEW BLOCK TO BE PROVIDED WITH A/C AND VENTILATION AS REQUIRED. REFER TO ASSOCIATED DRAWINGS OF THE BLOCK FOR FURTHER DETAILS

BLOCK A LEVEL 1 NEW MCR ROOM TO BE PROVIDED WITH A/C AND MECHANICAL VENTILATION

Mechanical Services

# AIR-CONDITIONING STRATEGY

# BLOCK A - MCR




- The new MCR will be provided with air-conditioning, i.e., wall-mounted split system with condenser located externally. The installation is to meet EFSG requirements, including enclosure for the condenser and refrigerant pipework to be hidden from view.
- Existing toilet exhaust system shall be modified as required to accommodate the new arrangement.

Mechanical Services

# TYPICAL COOLING & HEATING INFRASTRUCTURE SYSTEMS

## From EFSG DG 55.02:

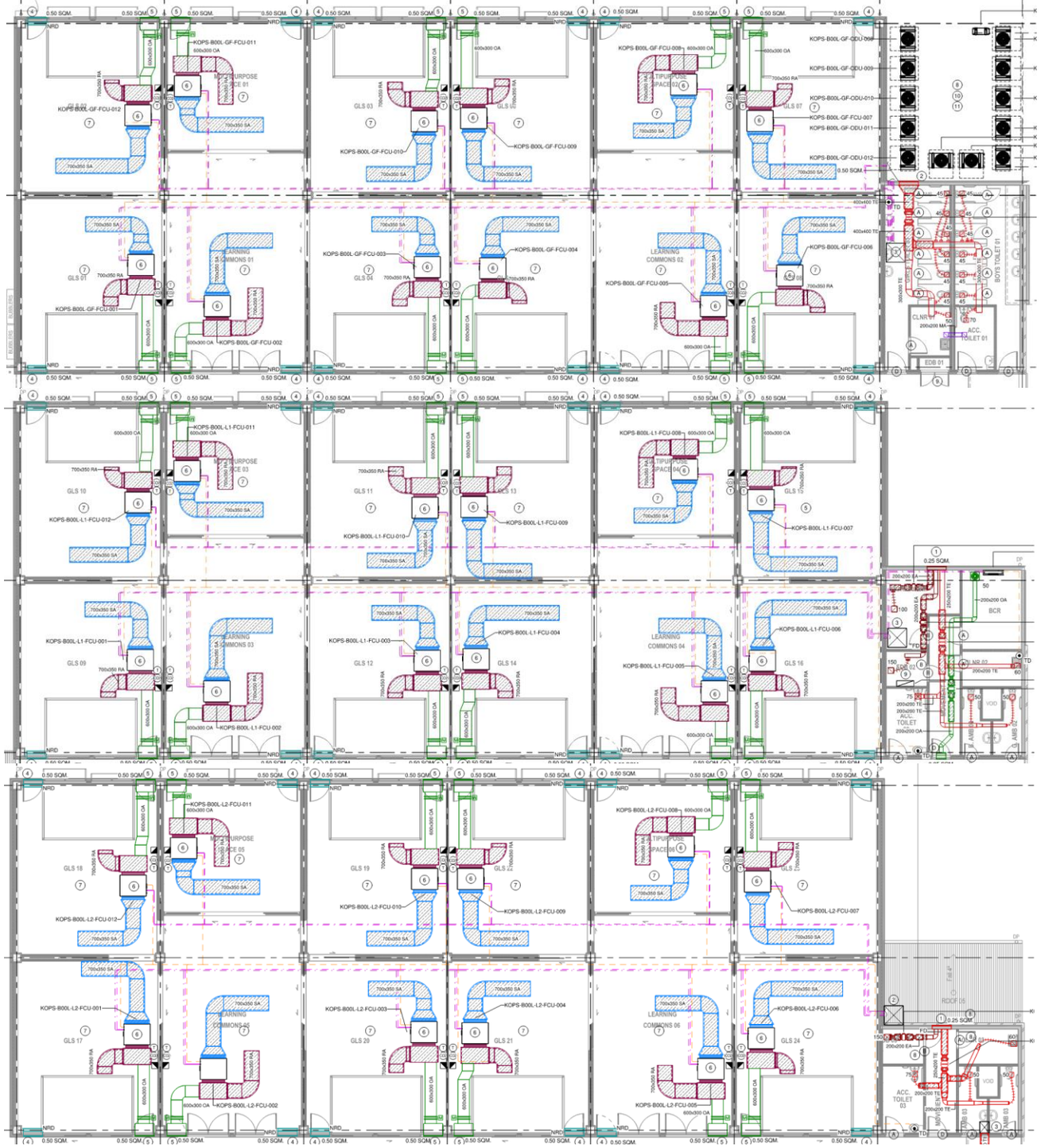
| School Type | Air Conditioning System | Ventilation | Design Considerations |
|---|---|---|---|
| Cooling system capacity below 900 kW | Centralised ducted VRF | Ducted fresh air | • Refrigerant Charge<br>• Energy Recovery Ventilator requirements due to specific conditions |
| Cooling system above 900 kW in a single building | Centralised ducted VRF<br><br>Or<br><br>Chilled/Heated Water System | Ducted fresh air | • Refrigerant Charge<br>• Energy Recovery Ventilator requirements due to specific conditions<br>• Centralised energy recovery ventilator to be considered<br>• Chilled water system should be considered |

**For Kogarah Public School, it is expected that the cooling system capacity load will be <900 kW and thus a centralised ducted VRF system shall be applied**

Mechanical Services

# AIR-CONDITIONING STRATEGY

# NEW LEARNING BLOCK L

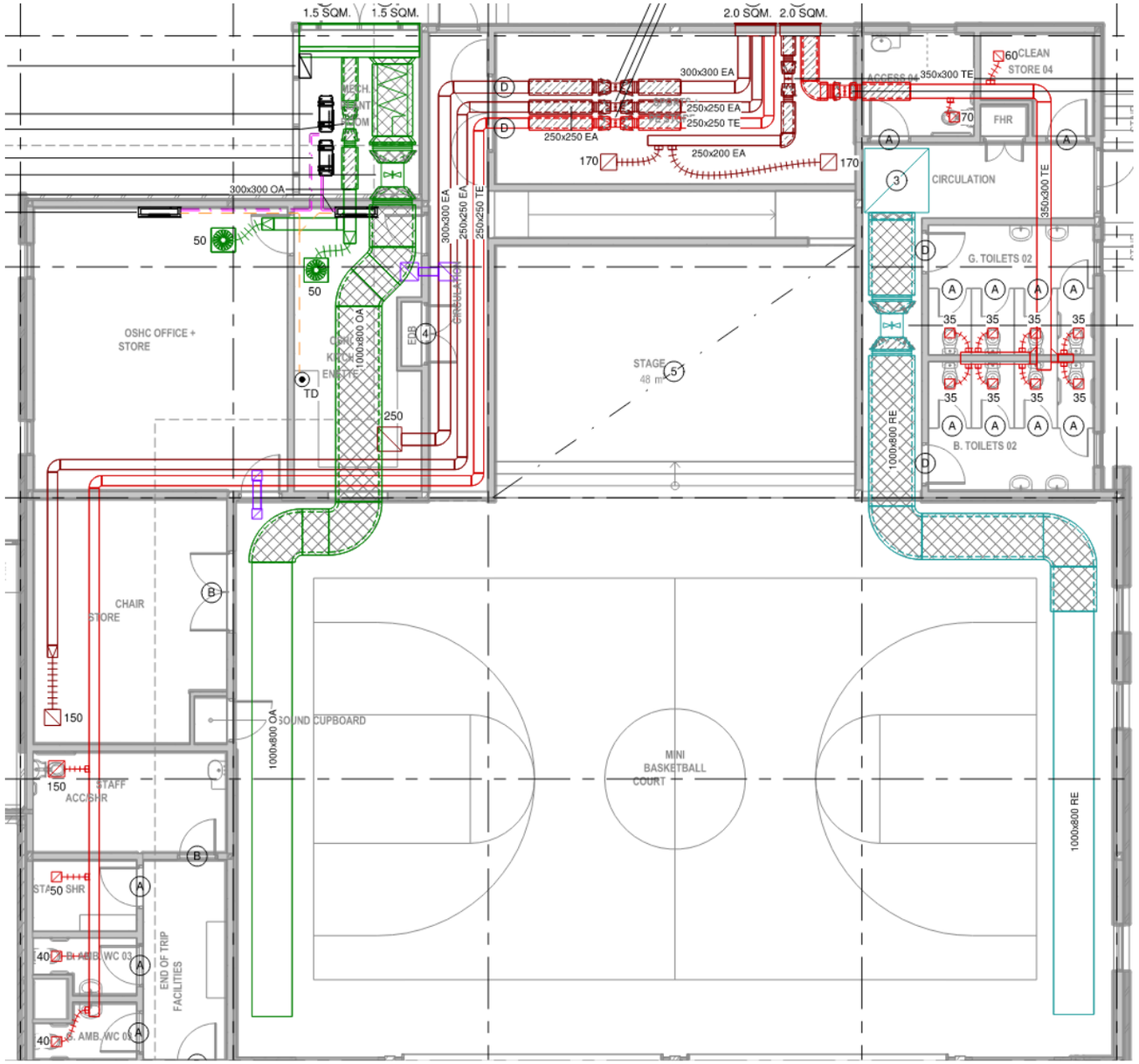



- GLS shall be air-conditioned in accordance with EFSG DG 55, i.e., in-ceiling ducted fan coil unit (FCU) with fresh air intake and relief air discharge louvres on façade. Condensers located on a dedicated external plant space
- Amenities (toilets, cleaners space) to be mechanically ventilated, with discharge via louvres on the northern façade
- BCR room shall be air-conditioned via wall-mounted split A/C with fresh air provision
- EDB rooms are mechanically ventilated via ducted in-line fan with exhaust discharge to external
- Lift is assumed to be of concrete and will be mechanically ventilated with exhaust discharge via roof cowl on roof and makeup air louvres at low level

Mechanical Services

# AIR-CONDITIONING STRATEGY

## NEW HALL



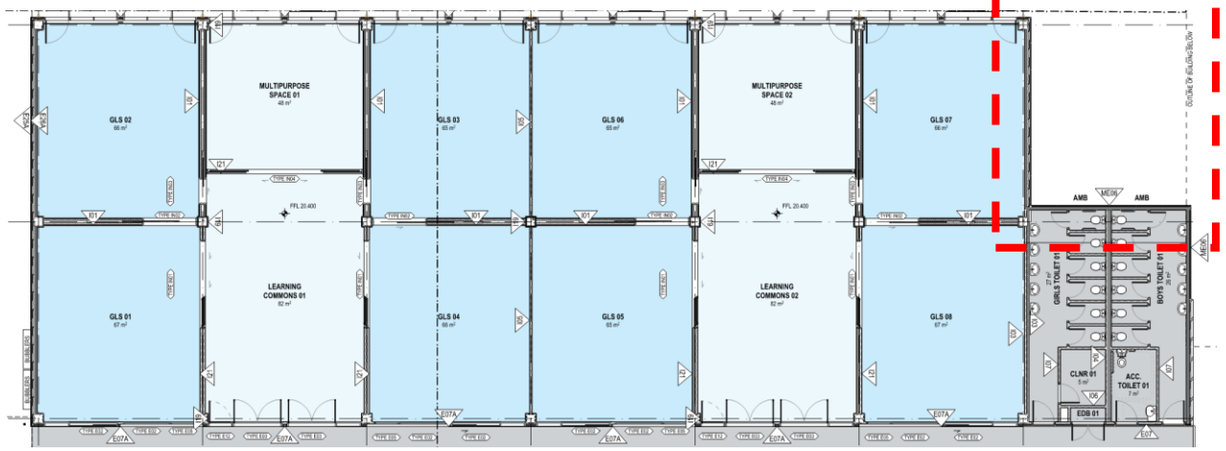

- Hall will be mechanically ventilated instead of naturally ventilated due to the its proximity to the main highway and to meet EFSG acoustics requirements. Hall will be provided with filtered fresh air supply via louvres located in the plantroom and relief achieved via ducted in-line fan with discharge to roof cowl on the hall rooftop
- OSHC office and kitchenette will be provided with wall-mounted split A/C system complete with filtered fresh air. Kitchen will also be provided with general exhaust ventilation, with no provision for kitchen exhaust, subject to finalization of equipment selection
- Amenities spaces will be mechanically ventilated, with exhaust discharges to louvres on the north façade of the PE Store.
- Mech Plantroom will be naturally ventilated with louvred façade wall and protected from rain ingress from roof above

# AIR-CONDITIONING PLANT SPATIAL

## OUTDOOR PLANT

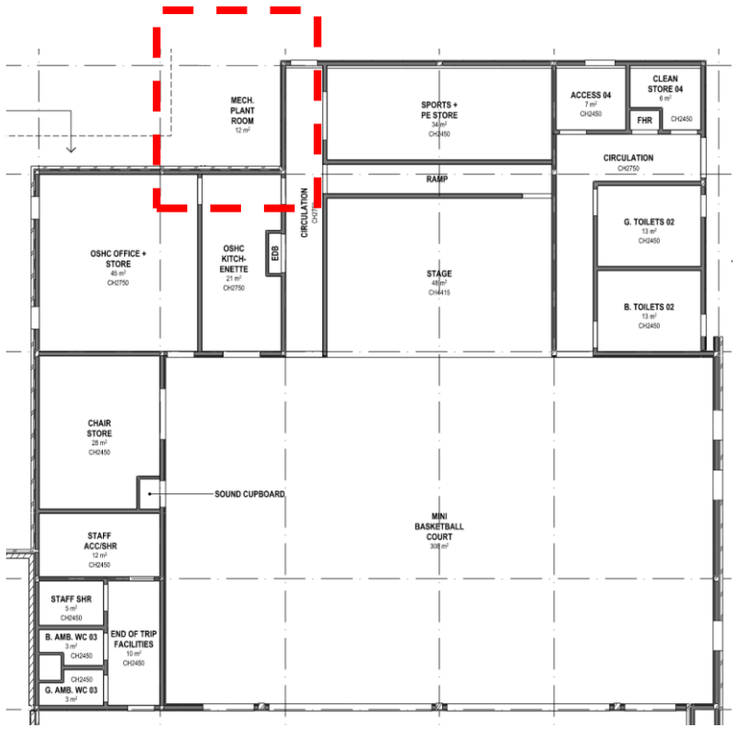
### New Learning Building

The A/C condensers for the new learning building will be located at ground floor at the min size of 60 sqm. Space will be open to sky with louvred façade.




### New Hall

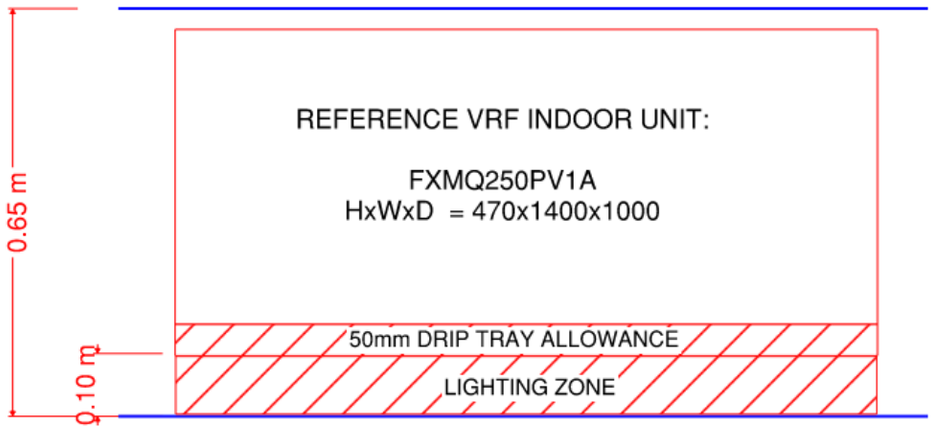
A new mechanical plant space will be provided to serve the new hall to house the A/C condensers serving the OSHC office and canteen as well as ventilation fans.




## INDOOR CEILING SPACE

The indoor ceiling space required to accommodate the new ducted VRF unit in the new building space is estimated to be:

650 mm (clear) high minimum.



# MECHANICAL CONTROL STRATEGY

Currently there is no Building Management Control System (BMCS) available in Kogarah Public School.

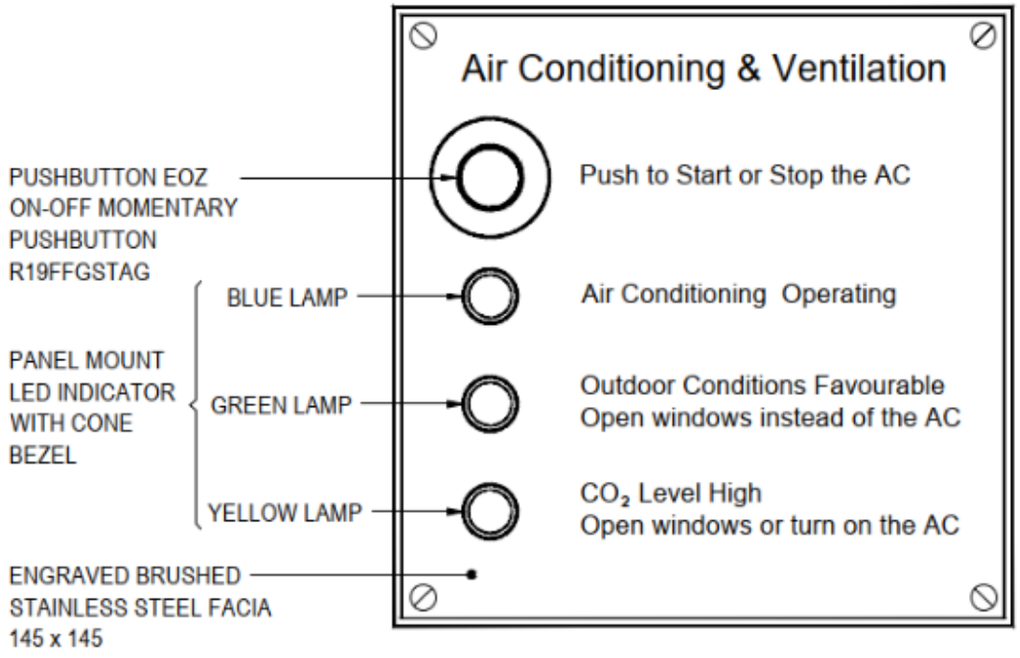
## NEW BUILDING

Building Management Control System (BMCS) is proposed to be installed for the **new building** to ensure fully integrated and operational mechanical services system, including:

- Enthalpy measurement will be used to determine favorable ambient conditions, to inform traffic light system of favorable outdoor conditions
- Dedicated space temperature sensor and CO2 sensor shall be provided to each general learning space
- User interface for operation of the systems via a Local Control Point incorporating pushbutton & Blue, Green and Yellow mode LED indication lights
- Central touch screen controller to control the A/C in the new building
- Metering and monitoring of the energy consumption of the building

Note that metering and monitoring is required as part of Greenstar compliance pathway for new buildings.

For Rooms with A/C, CO2 and Enthalpy Indication



# RISKS & OPPORTUNITIES

## Mechanical Plant Location & Proximity to Sensitive Receivers

The outdoor mechanical plant for the learning building (Block L) has been consolidated into a single plant area located on the ground floor and positioned close to the site boundary. The proximity of the plant to the residential building located north of the site presents a risk of noise pollution to nearby sensitive receivers. The final mechanical plant selection (confirmed during Phase 4 – Detailed Design) will need to meet the requirements of the Noise and Vibration Impact Assessment. Selection of noise plant may require additional acoustic mitigation measures or the separation of mech plant into different areas.