Prepared for
Department of Education, School Infrastructure NSW
ABN: 40 300 173 822

AECOM

Building Services Infrastructure Report

16-Sep-2021
SINSW01113-20 John Palmer Public School
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Building Services Infrastructure Report

Client: Department of Education, School Infrastructure NSW

ABN: 40 300 173 822

Prepared by

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1.0 Introduction

This AECOM Services Infrastructure Report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in support of a State Significant Development Application (SSD - 23330227).

The development is for upgrading works comprising alterations and additions to John Palmer Public School at 85 The Ponds Boulevard, The Ponds. The site is legally described as Lot 1 DP 1131340.

The site is roughly rectangular in shape, with a total area of 29,830m2 and street frontages to Pebble Crescent to the west, Jetty Street to the south and The Ponds Boulevard to the east. The Ponds Shopping Centre adjoins the northern property boundary of the school.

This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs), specifically:

13. Utilities

- In consultation with relevant service providers:
    - assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site.
    - identify any infrastructure upgrades required off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained.
    - provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development.

2.0 The Proposal

The proposed development seeks to upgrade John Palmer Public School. The upgrade consists of the following alterations and additions:

- Construction of a new three storey building facing The Ponds Boulevarde which will accommodate 29 Permanent Learning Spaces and 1 new staff room;
- Construction of a one storey new library building;
- Relocation of service access to staff car park off The Ponds Boulevarde, including alterations to the existing car park to accommodate service vehicle;
- One-storey extension to and refurbishment of existing School Hall building. The School Hall extension will accommodate ancillary spaces for Out of Hours School Care;
- Building Block D will be re-purposed from an existing library to special program spaces and administration;
- Refurbishment of Building F to provide 1 new support unit;
- Minor additions and internal refurbishments to Building A;
- Removal of all 20 existing demountable classroom buildings once alterations and additions have been completed; and
- Ancillary works to support the alterations and additions including landscaping and service provision.

3.0 Purpose of this Document

Based on the proposed alterations and upgrade, the overall demand on existing utility services infrastructure will grow. As a result, the site will require upgrades to impacted authority connections.

In response, this report aims to provide the following items to inform the strategy for servicing the proposed development:

- A summary of how the existing school is serviced:
  - Identification of any adverse effects on the supplies to the existing school which may be caused by the new building.
  - A summary of existing infrastructure services in the vicinity of the site.
  - A preliminary assessment of existing and proposed demand for each utility service.
  - An assessment of the indicative capacity of utility infrastructure currently servicing the site.
  - Potential external services infrastructure layouts to cater for the proposed development.

This report focuses on the following utility services infrastructure:

- Potable water infrastructure (Water)
- Wastewater infrastructure (Sewer)
- Natural gas infrastructure (Gas) and
- Electrical infrastructure (Elec)
- Data and telecommunications infrastructure (Telco)
- Fire Protection Services

Stormwater drainage and flood management infrastructure is described in a separate Stormwater Management Plan (SMP) and is not considered in this report.

3.1.1 Limitations

The recommendations included within this report are based on visual observations only (no measurements were recorded), information available at the time of writing, and are preliminary in nature.

The recommendations are subject to design development, coordination with advances in the proposed architectural and landscape architectural layouts, and consultation with approval authorities (i.e., for lead in utility works and Council requirements).

Please note that the utility infrastructure information provided in this report is detailed on record drawings provided by utility authorities through DBYD and technical enquiries made by AECOM and existing visual non-intrusive services surveys.

Assumptions included within this report, including existing site conditions, existing and proposed infrastructure capacity, and existing and proposed demand will need to be confirmed prior to detailed design and further consultation with the utility authorities.

3.2 Existing site wide infrastructure

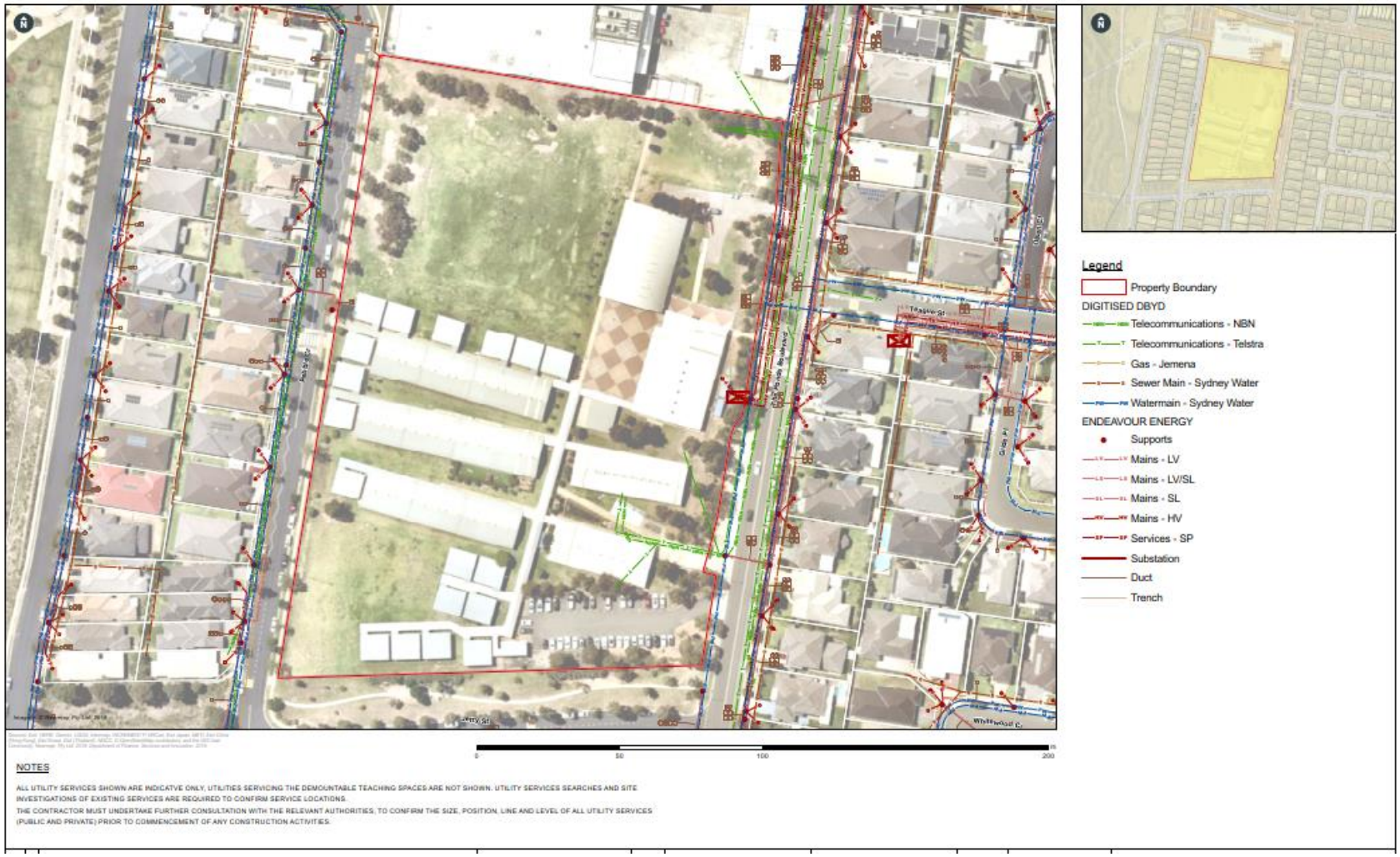

Figure 1 Existing Site Infrastructure Plan – Combined Services

LEGEND OF SYMBOLS

SANITARY / STORMWATER PIPEWORK	
	SANITARY PIPEWORK (BELOW SLAB/GROUND)
	SANITARY PIPEWORK (ABOVE SLAB/GROUND)
	DOWNPIPE / STORMWATER (BELOW SLAB/GROUND)
	DOWNPIPE / STORMWATER (ABOVE SLAB/GROUND)
	TRADE WASTE/GREASY WASTE (BELOW SLAB/GROUND)
	TRADE WASTE/GREASY (ABOVE SLAB/GROUND)
	GREY WATER (BELOW SLAB/GROUND)
	GREY WATER (ABOVE SLAB/GROUND)
	PIPE RISER
	PIPE DROPPER
	VENT PIPE

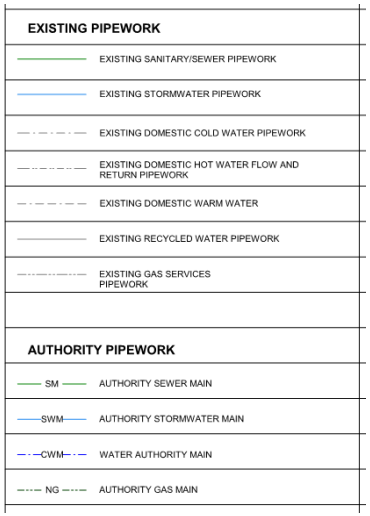

Figure 2 Site Wide hydraulic services reticulation plan

4.0 Hydraulic and Fire Protection Services

4.1 General

The hydraulic and fire protection services to the existing school campus comprise of the following:

- Utility water mains
- Utility sewer mains
- Utility gas mains
- Sanitary drainage systems
- Cold water services
- Gas services
- Fire Protection systems
    - Fire hydrant
    - Portable fire extinguishers
    - Fire Detection / Alarm system

4.2 Review of Existing Documentation

4.2.1 Standards and Guidelines

The hydraulic and fire protection services section has been prepared in accordance with the following standards and guidelines, as defined by the current Educational Facilities Standards and Guidelines (EFSG):

- DG51 – Hydraulics (General)
- DG52 – Drainage and Trade Waste
- PS Technical Data Summary - Drainage
- DG53 – Water
- PS Technical Data Summary - Water
- DG54 – Gas
- PS Technical Data Summary – Gas
- DG95 Stormwater
- PS Technical Data Summary - Fire Protection

4.3 Sewer and Sanitary Drainage

4.3.1 Network Utility Operators Sewer

4.3.1.1 Existing assets

A DBYD enquiry shows Sydney Water sewer mains around the site.

The site 150mm diameter sewage pipework from the site discharges to the 225mm PVC main, located in the north-western corner of the site.

4.3.1.2 Capacity analysis

According to the below table from the Sewerage Code of Australia - Sydney Water Edition, WSA-02-2002, the existing sewer mains in close proximity to the site meet the minimum size limitations to cater for the site.

The existing catchment area and current EP loading on these sewer mains however is currently unknown. It is possible that these mains are currently at peak capacity and are unable to cater for additional loading without an increase in pipe size.

Final determination of any upgrade works required will be subject to Sydney Water assessment via a Water Services Coordinator and approval under a Section 73 Application. It is not anticipated that any sewer mains upgrade will however be required.

Table 1 Sewage Demand Estimates

Pipework Diameter (DN)	Maximum Allowable EP
150mm	600
225mm	1,600
300mm	3,200

4.3.1.3 Foreseeable amplification and diversions

Sydney Water design for an Ø150 sewer main accounts for a maximum estimated population of 600, which equals to a maximum of 3000 students (based on 0.2 EP / student).

It is not anticipated that any sewer mains upgrade will be required.

4.3.1.4 Existing site infrastructure and proposed site wide reticulation

The existing site connection points are indicated on **Figure 1 Existing Site Infrastructure Plan – Combined Services** and **Figure 2 Site Wide hydraulic services reticulation plan**

4.3.2 Internal Sanitary Drainage Systems

4.3.2.1 Existing assets

The existing school campus conveys by gravity across the site from each of the various buildings to the 150mm sewer main to the 225mm Sydney Water sewer in the north-western corner of the site, refer to **Figure 2 Site Wide hydraulic services reticulation plan**.

4.3.2.2 Capacity analysis

Refer section above.

4.3.2.3 Foreseeable amplification and diversions

Minor site diversions of the existing sewer drainage will be required around the vicinity of the existing hall, plus modifications to the private sewer will be necessary for the new buildings.

4.3.2.4 Bespoke features and compliance issues

The overflow relief gully (ORG) and induct pipe mica flap (IMPF) could not be located on the perimeter of the site towards the North West of the site and should be uncovered or reinstated, as part of the upgrade works to the site.

A CCTV survey will be required to establish the condition of the existing sewer drainage pipework.

4.4 Water Services

4.4.1 Network Utility Operators Water

4.4.1.1 Existing assets

A DBYD enquiry shows the site is being serviced by dual reticulated Sydney Water 150mm / 200mm uPVC recycled water mains and 100mm / 250mm DICL potable water mains, running along The Ponds Boulevard and Pebble Crescent (refer to **Figure 1 Existing Site Infrastructure Plan – Combined Services**). Recycled water is supplied by the Rouse Hill Water Recycling Plant, the largest residential water recycling scheme in Australia, and is likely being used for toilet flushing and lawn irrigation.

4.4.1.2 Existing site infrastructure and proposed site wide reticulation

The existing site connection points are indicated on **Figure 1 Existing Site Infrastructure Plan – Combined Services** and **Figure 2 Site Wide hydraulic services reticulation plan**

4.4.1.3 Capacity analysis

An initial assessment of the increase in potable water demand, generated from the redevelopment has been made to determine the necessary potable water infrastructure upgrades. Demand estimates for potable water have been calculated below in Table 2 using the *Water Supply Code of Australia WSA 03-2002-2.2 (Sydney Water Edition)*.

It is likely that some of this estimated water demand (e.g., for toilet flushing) can be met through recycled water. On average, users in the Rouse Hill recycled water scheme area consume up to 40% less drinking water than other users in greater Sydney. The Development Servicing Plan 2016 for Rouse Hill Recycled Water System indicates that forecasting recycled water consumption for special uses such as schools is based upon the relative design allowances for that development. As such, the potable water demand estimates below are conservative and subject to confirmation at a later stage when the demand split for dual reticulation is determined.

From Table 2.1 of the above-mentioned Code, for primary schools, average and maximum day demand rate are assumed to be 45 kL/d/500 pupils and 90 kL/d/500 pupils respectively.

Table 2 Potable Water Demand Estimates

Yield	Average Day Demand (ADD) (kL/d)	Maximum Day Demand (MDD) (kL/d)
Current - 917 students	82	165
Future - 1012 students	91	182

4.4.1.4 Foreseeable amplification and diversions

Based on the increase of 9 kL/d, amplification of the existing DN150mm / DN200mm main is not envisaged to be required – however this would depend on the extent of existing flows through the DN150mm / DN200mm outside of the school site.

The exact lead-in infrastructure upgrade requirements should be confirmed through a formal capacity assessment from Water Services Coordinator via a S73 application, depending on the complexity of the network flow modelling may be required to confirm exact capacities will be required.

Diversions within the site are expected to cater to the proposed redevelopment with new building locations.

4.4.2 Internal Cold-Water Services

4.4.2.1 Existing assets

The campus is serviced by an existing 32mm diameter cold water meter and existing 50mm diameter recycled / non-potable cold-water meter, both located in a fenced enclosure adjacent the Fire Hydrant Booster Assembly on the perimeter of the campus, adjacent to The Ponds Boulevard.

Figure 3 Existing Potable and Non-potable water meter - The Ponds Boulevard Entrance

The in-ground potable water supply reticulates throughout the campus to serve each of the existing buildings, temporary demountable classroom buildings and external hose taps serving the irrigation system.

The demountable classrooms are each provided with a 20mm cold water connection.

4.4.2.2 Capacity analysis

Refer section above.

Statement of Available Pressure and Flow

Sydney WATER

Paul Angus
420 George Street
Sydney, 2000

Attention: Paul Angus Date: 11/05/2021

Pressure & Flow Application Number: 1112582
Your Pressure Inquiry Dated: 2021-04-13
Property Address: 85 The Ponds Boulevard, The Ponds 2769

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: The Ponds Boulevard	Side of Street: West
Distance & Direction from Nearest Cross Street	15 metres North from Teague Street
Approximate Ground Level (AHD):	59 metres
Nominal Size of Water Main (DN):	200 mm - **Recycled**

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	71 metre head
Minimum Pressure	45 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	45
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	45
	10	45
	20	45
	25	45
	30	45
	40	45
	50	44
	60	43
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	45
	10	45
	15	45
	20	45
	26	45
	30	44
	40	44
	50	43
Maximum Permissible Flow	118	37

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

Sydney Water Corporation ABN 49 776 225 038
1 Smith St Parramatta 2150 | PO Box 399 Parramatta 2124 | DX 14 Sydney | T 13 20 92 | www.sydneywater.com.au
Delivering essential and sustainable water services for the benefit of the community

Figure 4 Sydney Water Pressure and Flow Statement (Recycled Non-Potable Water Supply)

Statement of Available Pressure and Flow

Sydney WATER

Paul Angus
420 George Street
Sydney, 2000

Attention: Paul Angus Date: 10/05/2021

Pressure & Flow Application Number: 1112581
Your Pressure Inquiry Dated: 2021-04-13
Property Address: 85 The Ponds Boulevard, The Ponds 2769

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: The Ponds Boulevard	Side of Street: East
Distance & Direction from Nearest Cross Street	15 metres North from Teague Street
Approximate Ground Level (AHD):	59 metres
Nominal Size of Water Main (DN):	250 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	56 metre head
Minimum Pressure	40 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	40
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	43
	10	43
	20	43
	25	42
	30	42
	40	41
	50	41
	60	40
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	40
	10	40
	15	39
	20	39
	26	38
	30	38
	40	37
	50	36
Maximum Permissible Flow	120	29

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

Sydney Water Corporation ABN 49 776 225 038
1 Smith St Parramatta 2150 | PO Box 399 Parramatta 2124 | DX 14 Sydney | T 13 20 92 | www.sydneywater.com.au
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Figure 5 Sydney Water Pressure and Flow Statement (Potable Water Supply)

4.4.2.3 Foreseeable amplification and diversions

Modification works to the incoming water main meters and existing in-ground distribution throughout the site will be necessary to accommodate the fire hose reels requirements, supplied from the potable cold-water pipework.

The in-ground water supply reticulates throughout the site to serve each of the existing buildings, temporary demountable classroom buildings and external hose taps serving the irrigation system.

It is anticipated that diversions and extension to existing water services pipework within the site are likely to be required.

The new buildings shall incorporate a rainwater harvesting tank to conserve and minimize the use of potable cold-water consumption. The recycled water shall be used for irrigation and WC flushing.

Water saving fixtures and fittings shall also be incorporated throughout the site.

As-built drawings have been provided, however it is appreciated that the building layouts and functions have changed over time with various fit outs and therefore we have no way of establishing the current services layout is 100% accurate. Contractor will require to investigate on site when refurbishments work commence.

4.4.2.4 Performance requirements

All water systems will be designed in accordance with legislation and standards, with the following noted performance requirements:

- Working velocities in pipes shall be limited to a maximum of 1.8 m/s
- Maximum operational pressure 500 kPa
- Minimum operational pressure 200 kPa
- The following maximum flow rates shall be provided to fixtures:
    - WC cistern 3.5 l/min (4.5 / 3 litre dual flush)
    - Basins 4.5 l/min
    - Sinks 7.5 l/min
    - Hose taps 12.0 l/min
    - Showers 7.5 l/min
- Water sub-metering

Water sub-metering will be provided for each of the main buildings and irrigation to facilitate individual monitoring of water use.

4.4.2.5 Bespoke features and compliance issues

At the time of the inspection, there were no issues reported with water pressure or flow performance and no non-compliances were noted.

In the short term, the current water meter assembly is sagging and will require to be modified.

4.5 Gas Services

4.5.1 Network Utility Operators Gas

4.5.1.1 Existing assets

Available DBYD data indicates that gas is supplied to the neighbourhood by Jemena through a 210 kPa distribution main that runs along adjacent roads, The Ponds Boulevard, Jetty Street and Pebble Crescent. The available DBYD plans do not show any external gas mains connections to the site.

However, presence of existing gas meter on site indicates that other gas providers may presently service the site through a combination of high pressure and reticulation mains.

The depths and position of the existing reticulation mains within the school remain unknown, further surveys are required to determine the exact layout

4.5.1.2 Existing site infrastructure and proposed site wide reticulation

The existing site connection points are indicated on **Figure 1 Existing Site Infrastructure Plan – Combined Services** and **Figure 2 Site Wide hydraulic services reticulation plan**

4.5.1.3 Foreseeable amplification and diversions

The existing gas supply within the site will need diversions and amplification to provide a central hot water plant for the proposed new building layouts. However, it is possible that the new gas demand will be offset by the discontinued use of existing gas heaters in classrooms.

4.5.2 Internal Gas Services

4.5.2.1 Existing assets

The gas meter and boundary regulator is located to the rear of fire hydrant booster assembly on the perimeter of the campus, on The Ponds Boulevard.

The pressure reticulating throughout the site could not be ascertained at the time of the inspection and compiling this report.

Figure 6 Existing Gas Meter and Boundary Regulator - The Ponds Boulevard Entrance

4.5.2.2 Capacity analysis

The incoming 20mm gas supply is assumed to have a maximum inlet pressure of 400kPa – the data badge is extremely weathered. The as-built / constructed drawings will be required to confirm.

The existing 50mm supply is regulated to an assumed outlet pressure of 2.75kPa, – the data badge is extremely weathered - the as built / constructed drawings will be required to confirm.

The gas conveys reticulates to gas heaters located within each classroom located in Blocks A - G only. The demountable classrooms have no gas supply.

Based on a metering pressure of 2.75kPa and 50mm diameter distribution pipework the maximum gas load achievable is 1,008 MJ/hr.

The gas supply is reticulated to each of the Bowin LB90 Flueless Convection Gas room heaters.

Based upon the buildings inspected and without the assistance of As-Built / constructed drawings it has been assumed that 2 gas heaters are located within each classroom. Each heater consumes 17MJ/hr, the total gas load for the site can be summarised within Table 3.

Table 3 Gas consumption summary

Location	Level	Number of heaters	Gas load (MJ/hr)
Block A	Ground level	6 No. (unconfirmed)	102
Block B	Ground level	0 No. (unconfirmed)	0
Block C	Ground level	2 No. (unconfirmed)	34

Block D	Ground level	6 No. (unconfirmed)	102
Block E	Ground level	6 No. (unconfirmed)	102
Block F	Ground level	6 No. (unconfirmed)	102
Block G	Ground level	6 No. (unconfirmed)	102
		Total	**544**

The index length of the gas pipework will also require to be taken into account during the design stage, however it has been established that the existing gas load has spare capacity.

It is understood that the future heating provisions to classroom will be undertaken via the reverse heating cycle on the air conditioning system and all gas heaters will become redundant.

This will allow any future provisions for gas fired hot water heaters; however it is envisaged that local point of use electric instantaneous / heat pump hot water heaters will be the preference, based on limited hot water usage.

4.5.2.3 Foreseeable amplification and diversions

The existing gas supply will require modifications, based upon the gas heaters being replaced in the refurbished and new buildings with air conditioning (reverse heating) for the proposed new building layouts.

As-built drawings have been provided, however it is appreciated that the building layouts and functions have changed over time with various fit outs and therefore we have no way of establishing the current services layout is 100% accurate. Contractor will require to investigate on site when refurbishments work commence.

No increase to the existing gas supply is required. The contractor will require to liaise with Jemena for the relocation of the boundary meter and regulator.

4.5.2.4 Bespoke features and compliance issues

There are no issues reported from the facilities team and no issues were uncovered during the time of the inspection.

A number of unflued gas heaters were noted to be installed throughout the school building. This model of gas heaters do not have a flue to the atmosphere and require specific cross ventilation requirements.

It is understood that the future heating provisions to each classroom will be undertaken via the reverse heating cycle on the air conditioning system and the existing gas heaters will become redundant and be disconnected. However, in the short term all obstructions located within 1m of the gas heaters should be assessed and moved accordingly.

4.6 Fire Protection Services

The fire protection services to the existing site comprise of the following:

- Fire hydrant and hose reel system,
- Portable fire extinguishers.
- Fire Detection/Alarm system

4.6.1 Existing Wet Fire Services assets

4.6.1.1 Existing site infrastructure and proposed site wide reticulation

The existing site connection points are indicated on **Figure 1 Existing Site Infrastructure Plan – Combined Services** and **Figure 2 Site Wide hydraulic services reticulation plan**

4.6.1.2 Water Supply System

The recycled water supply to the fire hydrant system is an AS 2118 Grade II supply comprising a 100mm diameter supply via a backflow valve assembly from the Sydney Water Authority recycled main, located on the Ponds Boulevard.

Figure 7 100mm External Fire Hydrant Supply -The Ponds Boulevard Entrance

The existing fire hydrant booster is located within an enclosure, which was not locked.

No signage was located on the external of the fire enclosure.

A car was parked directly in front of the booster assembly, with no signage located to highlight no parking was evident.

4.6.1.3 Hydrant System

The fire hydrant booster assembly is supplied from the recycled cold-water network and currently serves the school campus.

Town main's pressure is utilised throughout the site, with no electric or diesel booster pumps installed on the existing system.

The fire services pressure and flow rate was not indicated on the fire hydrant block plan. From the pressure gauge on the fire hydrant booster assembly, the pressure was noted as being just below 500kPa.

The site and associated buildings are protected via an existing 100mm diameter below ground hydrant system.

There are four external double pillar fire hydrants providing fire coverage to the campus, generally complying with the requirements of AS 2419.1.

Figure 8 100mm External Fire Hydrant & Block Plan

4.6.1.4 Fire Hose Reels

Fire Hose reels are installed in the existing hall, located within 4m of the fire exit.

Figure 9 Fire Hose Reel Hall

The fire hose enclosure near the hall entrance appeared to be constrained in height. The fire hose reel should be fully unrestricted and may require modification works.

4.6.1.5 Portable Fire Extinguishers

Portable fire extinguishers are located throughout the site. These comprise of water, CO_2 and dry powder, complete with signage and mounting brackets.

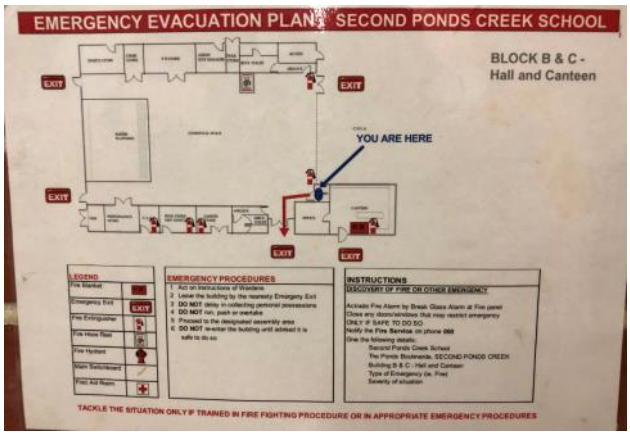

Figure 10 Fire Extinguisher Locations

A fire evacuation plan identifies the location of all fire extinguishers, fire blankets and dry chemicals, generally located within exit/entry locations to each building.

4.6.2 State of Repair

Maintenance tags indicate that periodic testing is being carried out by the management agent Celsius. The maintenance contracts generally appear to be compliance with the requirements of the relevant Standards, in accordance with the date of installation.

No permanent Fire Hydrant block plan was displayed, which is **non-compliant**. A laminated block plan was located at the bottom of the booster assembly enclosure; the information on the laminated block plan was incomplete and did not display the flow and pressure testing data.

The location of the existing fire hydrants on campus is **non-compliant** - being located less than 10m to the building(s).

The hydrant opposite the Hall is **non-compliant** being less that 750mm (700mm) above FFL and will require to be raised in height.

The existing hydrant pipework will require to be extended and provide a minimum of two additional hydrants.

The above works will be rectified as part of the upgrade works to the hydrant system.

4.6.3 Capacity analysis

Refer to Hydraulic section of the report for the details of the Sydney Water Tap In Pressure and Flow enquiry. From analysing the pressure and flow enquiry, a new fixed on-site fire pump is required to boost pressures, as determined by the above standards.

4.6.4 Foreseeable amplification and diversions

The existing fire hydrant booster assembly is required to be relocated from the current location at the North West of the site to the south west corner of the site.

The existing fire hydrant system will require to be modified to provide adequate coverage to the proposed new buildings on the campus, in accordance with AS 2419 and National Construction Code requirements.

A new fixed on-site fire pump is required to boost pressures, as determined by the above standards.

4.6.4.1 Hydrant locations

External fire hydrants shall be located a minimum of 10 metres away from the nearest building structure. External fire hydrants shall also be positioned to ensure every point of the building can be reached by a 10-metre hose stream from a 30-metre fire hose laid out in the actual path of travel to the point of coverage.

External fire hydrants may be used to protect buildings up to one level above ground access level only (i.e., Level 1). Any buildings with two or more levels will require an internal hydrant system.

Internal Fire hydrants shall be located such that every point of the building can be reached by a 10-metre hose stream from a 30-metre fire hose laid out in the actual path of travel to the point of coverage.

In addition, hydrants should be located to ensure that every room within the proposed new buildings on the campus must be reachable by a fire hose, with at least 1 metre of fire hose able to be extended into the room.

Fire hydrants shall be typically located within each floor landing of all fire stairs, and as otherwise necessary to achieve full coverage throughout the building.

Fire hydrants shall not pass-through fire doors or smoke doors, where required fire hydrants shall be provided on each side of fire and smoke doors as necessary to achieve full coverage.

4.6.4.2 Hydrant pressure and flow characteristics

Fire hydrant mains shall have capacity to supply a flow of 10 l/s to each fire hydrant landing valve under fire brigade boosted operations.

Fire hydrant service pipework shall be sized such that the maximum velocity within any pipework is as follows;

Table 4 Hydrant Sizing

Location	Flow (l/s)	Maximum Velocity (m/s)
All locations	10	4.0

Fire hydrant pipework shall be sized so that the pressure loss due to friction in the reticulation system between the booster valve assembly and the most hydraulically dis-advantaged fire hydrant is limited to a maximum pressure loss of 150kPa.

Fire hydrant services shall be designed to ensure that a minimum outlet pressure of 700kPa is available at every fire hydrant within the proposed school campus redevelopment. Where required, pressure limiting valves shall also be provided to ensure that a maximum pressure of 1200kPa is available at any fire hydrant within the proposed school campus redevelopment.

4.6.4.3 Fire Hose Reel System

In accordance with National Construction Code and EFSG – Fire Protection Technical Data fire hose reels will be required to be installed – (note classrooms are exempt).

4.6.4.4 Hose Reel locations

Fire hose reels shall be located such that every point of the building can be reached by the nozzle end of a 36-metre hose reel laid out in the actual path of travel to the point of coverage.

Fire hose reels shall be typically located within 4 metres of all required fire exists, and as otherwise necessary to achieve full coverage throughout the building.

Fire hose reels shall not pass-through fire doors or smoke doors, where required fire hose reels shall be provided on each side of fire and smoke doors as necessary to achieve full coverage.

A system of main supply risers and on floor reticulation shall be used to achieve the most economical fire hose reel service installation.

4.6.4.5 Hose Reel pressure and flow characteristics

The fire hose reel service shall be sized to provide a flow rate of 0.33L/s at the most disadvantaged fire hose reel. In addition, the mains shall have capacity to provide for two fire hose reels to operate simultaneously. Fire hose reel service pipework shall be sized such that the maximum velocity within any pipework is as follows.

Table 5 Hose Reel Sizing

Location	Flow (l/s)	Maximum Velocity (m/s)
External Locations (in Ground)	0.33	2.4
Internal Locations (in Walls and Ceilings)	0.33	1.5

Fire hose reel services shall be designed to ensure that a minimum outlet pressure of 250kPa is available at every fire hose reel within the proposed school campus redevelopment. Where required, pressure limiting valves shall also be provided to ensure that a maximum pressure of 500kPa is available at any fire hose reel within the proposed school campus redevelopment.

Water supply to the fire hose reel service shall be a dedicated supply drawn from the metered potable cold water service.

4.6.4.6 Hydrant and hose reel spatial requirements

Table 6 Hydrant and hose reel spatial requirements

Item	Description	Area (m^2)	Configuration	Comments
1	Fire Hose Reel Cupboards	0.54	0.9m x 0.45m	Fire hose reel cupboards located within 4m of the entry to every fire stair at every level within the building, and as otherwise required to achieve full coverage from 36m hose reels.
2	Fire Hydrants	0.15	0.5m x 0.3m 1.2m high	External – 10m from the buildings. Internal - Fire hydrant located within each fire stair at each level of the building, and as otherwise required to achieve full coverage from 30m hose length.

4.6.5 Bespoke features and compliance issues

In the immediate short term, it is a recommendation to undertake the following additional works:

- Provide external signage to the existing fire hydrant booster assembly, in accordance with AS 2419; and,
- Provide a permanent fire services block plan indicating all existing site hydrant features (including assumed pipe routes), available pressure and flow test performance characteristics and Australian Standard of installation, in accordance with AS 2419 requirements.

- The hydrant opposite the Hall is non-compliant being less that 750mm (700mm) above FFL and will require to be raised in height.
- The location of the existing fire hydrants on campus is non-compliant - being located less than 10m to the building(s).
- Additional fire hydrants and fire hose reels will be required to provide coverage to all existing and new proposed buildings

It is best practice to retro-fit FRNSW / RFS compatible Storz screw on couplings to the existing hydrant stand pipes to enable quick connection and intervention in accordance with AS 2419 requirements.

It is recommended that the fire maintenance contracts be provided for further analysis for effectiveness and compliance with the essential services maintenance provisions of the National Construction Code (NCC); this should include a review of the following:

- Annual Fire Safety Statement (AFSS) of the facility;
- Fire and life safety assessment of existing facility;
- Performance assessment of existing fire system, assumed to be ordinance 70;
- Assessment of existing Occupation Certificates, Council Orders or Annual Fire Statements to determine the existing site compliance benchmarks;
- Review of maintenance records, operations and maintenance manuals; and,
- As built documentation was not available during the course of the desktop study or at the time of reporting.

Whilst the fire protection services design and installation appear to comply with the requirements of the Building Regulations and design standards at the time of installation, the Building Regulations and some of the referenced Australian standards have changed in the period since the original installation.

4.6.6 Fire Detection / Alarm system

4.6.7 Existing assets

The existing fire services system installed throughout the school campus consists of a fire detection system and includes the following devices:

Smoke detectors.

The following items were not installed:

- Fire Indicator Panel;
- Break glass alarm;
- Fire bells; and
- Occupant Warning System.

4.6.8 State of Repair

The existing detectors may be reaching the equipment’s end of life. It is recommended to replace detectors that have been in service for 10 years or more. New and existing detectors are to be maintained throughout the school campus in accordance with AS1851 – Routine service of fire protection systems and equipment.

4.6.9 Capacity analysis

The fire panel could not be observed during the site inspection. As a result, the following could not be determined:

- Model/type of the panel;
- Available capacity to accommodate additional devices; and,
- Battery backup capacity.

4.6.10 Foreseeable amplification and diversions

In accordance with the Educational Facilities Standards and Guidelines (EFSG) Technical data Summary Fire Protection, a fire detection and alarm system will be required in line with the National Construction Code.

The proposed new Main Fire Detection Control and Indicating Equipment (FDCIE) location will be subject to the fire brigade approval.

4.6.11 Proposed site connection points

The fire detection and alarm system will be designed in accordance with AS1670.1-2015 and include, as a minimum, the following items:

- Main FDCIE,
- FDCIE (where required)
- External alarm strobe
- Smoke detectors
- Thermal detectors
- Break glass alarm
- Occupant Warning System.

4.6.12 Automatic Fire Detection and Alarm System

A new automatic fire detection and alarm system shall be provided to the following buildings, in accordance with the relevant Australian Standards, National Construction Code and EFSG Technical Data Summary:

New proposed buildings

- Buildings proposed to be refurbished or extended (existing detection to be upgraded in line with current standard)
- Existing buildings that are remaining with no scope of work involved, will maintain the existing fire detection system as installed in line with original standards.

The system shall be fully automatic addressable fire detection and alarm system that is controlled and monitored by a Main FDCIE located at the designated site entry point.

The FDCIE will consist of Alarm Signalling Equipment (ASE) for automatic notification of a fire alarm to the Fire Brigade via a third-party monitoring provider.

The existing fire detection systems serving the existing buildings which are remaining will be interfaced with the new FDCIE if the systems are compatible. However, the existing detection system components and configuration will need to be verified to ensure that the existing system is compatible with the new fire detection and alarm system.

The new automatic detection and alarm system shall incorporate an Occupant Warning System (OWS) to sound throughout the new and refurbished/extended buildings of the school campus during a fire condition. A Sound Systems and Intercom Systems for Emergency Purposes (SSISEP) is not required to the school campus as the proposed buildings do not have a rise in storey more than 3 and are also less than 25m in effective height.

The Occupant Warning System will be automatically initiated by the automatic detection and alarm system or activation of manual call point.

Occupant warning speakers will be provided throughout each of the new and refurbished/extended buildings to provide the required sound pressure levels to all occupied areas of the building. Speech intelligibility performance is not required provided that live speech facilities are not required for the OWS; however, this is subject to consideration by all relevant stake holders.

Visual Alarms (Strobes) will be provided in areas with high ambient noise level, and to any areas specified for use by hearing impaired occupants.

4.6.13 Bespoke features and compliance issues

The new buildings will have a new fire detection and alarm system and occupant warning system in accordance with the current NCC and Australian Standards. To maintain consistent fire protection system throughout the buildings where extensions/refurbishment works are taking place, it is recommended to perform the following:

Upgrade the existing detection system to the current BCA and Australian Standards.
Provide new fire detection and alarm system to the buildings being extended/refurbished in accordance with the current BCA and Australian Standards.
Provide new occupant warning system to the buildings being extended/refurbished in accordance with the current BCA and Australian Standards.

The fire protection services design and installation is understood to comply with the requirements of the Building Regulations and design standards at the time of installation. The Building Regulations and some of the referenced Australian standards have changed in the period since the original installation. As a result, the existing installation may not comply with the requirements of the current standards.

Certification of the fire protection services is assumed to have been obtained at the time of installation, deeming fit for purpose and therefore it would be deemed to meet the design intent.

The fire protection services appear in satisfactory condition and suitable for continued use in their present condition, provided the current level of maintenance and testing is continued.

This will need to be confirmed by the BCA/NCC consultant.

5.0 Electrical and Information & Communications Technology (ICT) Services

5.1 Electrical Services

5.1.1 Existing assets

5.1.1.1 Existing Incoming Supply and Substation

The school is currently supplied by one dedicated Endeavour Energy padmount substation 26650 located at the eastern end of the school on The Ponds Boulevard (refer to Figure 11)

Preliminary assessment of the DBYD Endeavour Energy documents and current switchboard drawings indicated the consumer mains are 1x4C 240mm^2 XPLE cable in buried conduit.

Based on initial visual observations, the estimated substation size according to its physical size is of the order of 500k-750kVA.

Initial informal enquiries have been made with Endeavour Energy as to the substation size, spare capacity available and the actual maximum peak demand of the site.

An ASP3 consultant has now been engaged to commence the proposed upgrade works.

Figure 11 Existing Padmount Substation

5.1.1.2 Existing Main Switchboard (MSB)

The main switchboard is located in Building B main switchboard room, access to the MSB is from the south end of the building.

The MSB was installed in 2008, we would generally expect 20-25 more years of lifetime for a switchboard, however it is highly dependent on the level of maintenance over the life of the switchboard.

Service protection device (SPD) at MSB is rated at 400A.

Figure 12 Existing MSB

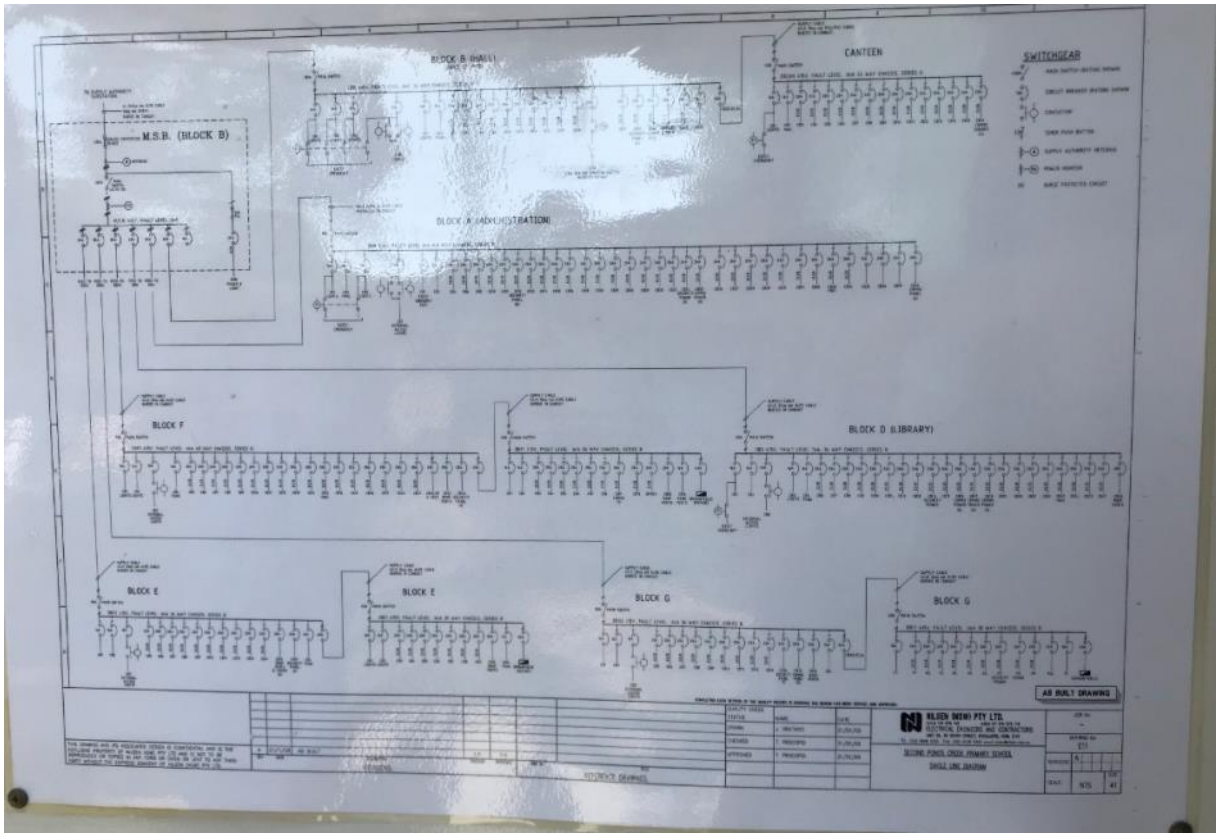

Figure 13 Single Line Schematic

5.1.1.3 Electrical Distribution Switchboard (EDB)

Each of the permanent buildings has their own distribution boards located within the buildings; one distribution board from each building is fed from the MSB via submain circuits.

The demountables located on the northern and western side of the school are supplied from the closest building's distribution boards. Demountables located on the southern side of the school are fed from DB-H located between the carpark and Building G.

It appears the power reticulation from the MSB to the EDBs are in conduit buried in ground, a detailed in ground survey is required to determine the exact routes.

Figure 14 Typical Building Electrical Distribution Board

5.1.1.4 PV System

The school does not have a PV system at the time of inspection.

5.1.2 Capacity analysis

As noted previously, formal technical enquiry application will need to be lodged with Endeavour Energy to confirm maximum peak demand for the site, as a priority at the next stage of study for the proposed upgrade works.

On the basis of this initial assessment, it has been established that an upgraded supply substation will be required to support the proposed upgrade works

5.1.3 Foreseeable amplification and diversions

The upgraded supply substation and main switchboard will be required to support the proposed upgrade works.

The location and design of the new substation and the new MSB will be subject to further discussion with Endeavour Energy. From initial discussions, the location of the substation will remain.

From initial discussions with Endeavour Energy - UUL1968 FW: Application for additional load for John Palmer Public School the following has been ascertained:

- The existing kiosk substation can be upgraded to a 1,000kVA substation, no need for a second kiosk substation.
- increase the footprint of the existing kiosk substation.
- anticipate replacing the substation at the same location, which will require up to two days power shutdown to the school.
- plan for these changeover works to be undertaken over a weekend.

The appointment of as ASP3 level consultant, has now been engaged, for the upgrade works.

The existing MSB will be converted to a main distribution board (MDB) and supplied from the new MSB.

A new main switchboard will need to be installed within 50 metres of the substation. A new building to house the main switch board may be required. In ground works and excavation will be required.

Final verification will need to be made with Endeavour Energy to determine the overall peak demand of the school and substation capacities.

To accommodate the addition of the new proposed buildings, a new MSB will be required, and in-ground works to install all new supplies to the new development.

The existing MSB will be converted to a main distribution board (MDB) and supplied from the new MSB.

5.1.4 Bespoke features and compliance issues

All works to be in accordance the relevant Australian standards and NSW Department of Education EFSG guidelines.

Modification to the existing infrastructure will trigger the following compliance issues:

- All new subcircuit lighting and power will need to be on RCD circuit breakers (safety switches).
- In accordance with NSW Department of Education – EFSG – DG61 Electrical Services minimum service / consumer mains will need to be rated at 800amps for 1000 students (assume Primary school rated at 1000 Students will be of similar load to high school students

Grid connected solar PV system shall be provided to the new buildings to offset power consumption costs in accordance with NSW Department of Education – EFSG – DG66 Photovoltaic Solar Power Generator.

5.1.5 Opportunities and Constraints

As noted previously, formal technical enquiry application will need to be lodged with Endeavour Energy to confirm maximum peak demand for the site as a priority at the next stage of study for the proposed upgrade works.

The main site switchboard will require modifications or replacement. The site will require power shutdowns to facilitate the upgrades for a new main switchboard; this may have to be done during school holidays.

5.2 Data and Telecommunications

5.2.1 Existing assets

The existing communication system consists of NBN entering the site and fibre optic and copper distributed to classrooms, offices and other amenities.

The school's main server and communication racks are located in a dedicated communication room in building D (Library).

Figure 15 Main Communications Rack

5.2.2 Capacity analysis

A preliminary indicative appraisal of service load / demand associated with the proposed upgrade works has been carried out based on the preliminary master plan options and associated area schedules provided by SINSW as detailed in previous section of this report.

The incoming supply is NBN fibre and is considered likely to have sufficient capacity to cater for the replacement of the demountable classrooms to new permanent classrooms.

An additional rack and Ethernet switch may be required to accommodate future expansion within the main communications room.

Additional spaces within the comms room will be required for the additional new cabinet.

5.2.3 Foreseeable amplification and diversions

New communication cabinet will be required to comply with the latest standards. The new location has been provided within the new library.

New upgrades to the IT infrastructure will be required to align with the NSW Department of Education – EFSG – DG64 Communications Standards.

Consultation with the School Principal and the DoE Regional ICT will be required to formulate a brief for the upgrades effect by the new building works.

5.2.4 Bespoke features and compliance issues

NSW Department of Education – EFSG – DG64 Communications Standards requires provision of a main communication room for new or approved projects for additional accommodation. DG-64 requires allowance for provision of following cabinets 1, 2 and 3 and additional space and power for cabinet 4:

- 45RU cabinet nominal 800mm wide by 900mm deep as the ITD ICT Services cabinet;
- 45RU cabinet nominal 800mm wide by 900mm deep as the campus and building distributors;
- 45RU cabinet nominal 800mm wide by 900mm deep with a server shelf for file servers; and
- Cabinet 4 may be required and is dependent on the cabling density required.

The existing main server room and associated ICT infrastructure is not compliant with these requirements.

5.2.5 Opportunities and constraints

Current master plan layout options propose the back conversion of Building D (library) which houses the existing main server rack and these facilities will either need to be maintained within existing building D as part of new dedicated and DG64 compliant main communications room, or otherwise relocated to new main communications room to be provided within the proposed new buildings.

Access to this server room need to be provided after the back conversion.

During the construction stage of the back conversion of Building D (library), power supply to the main server racks and the main communication room needs to be maintained, with un-interrupted and dedicated access to the communications room available.

6.0 Summary and Recommendations

6.1 General

Details of desktop study, site visit and preliminary engineering appraisal activities have been presented in the previous sections of this report for the following technical disciplines:

Hydraulic and Fire Services;
Electrical and ICT Services; and
Mechanical Services.

Summary of key risks, constraints and issues identified as outcomes of these activities are presented in the following subsections in concise tabular format.

At this early stage and in the absence of detailed site investigation and extended data collection period, it is difficult to be definitive in providing recommendations for each of the identified risks, constraints and issues.

Accordingly, a likelihood descriptor has been assigned against each, consistent with a typical risk management approach. The likelihood descriptors that have been adopted are defined in Table 7.

Table 7 Adopted Likelihood Descriptors

Almost Certain	Very likely. The event is expected to occur in most circumstances as there is a history of regular occurrence at similar institutions
Likely	There is a strong possibility the event will occur as there is a history of frequent occurrence at similar institutions.
Possible	The event might occur at some time as there is a history of casual occurrence at similar institutions
Unlikely	Not expected, but there's a slight possibility it may occur at some time.
Rare	Highly unlikely, but it may occur in exceptional circumstances. It could happen, but probably never will.

Recommendations on the associated planning and infrastructure implications are provided for each item consistent with the assigned likelihood descriptor.

It is recommended that this report and the following summary tables are provided to the parties responsible for ongoing master planning, design and initial budget costing works associated with the proposed upgrade works.

6.2 Hydraulic & Fire Services

Table 8 Summary and Recommendations – Hydraulic and Fire Services

Item		Risk / Constraint / Issue	Likelihood	Summary and Recommendations
6.3.1	Network Utility Operators sewer	Existing external sewer infrastructure servicing site not able to support proposed development	Likely	• Upgrade to external sewer infrastructure may be required to support proposed development at this site (increase from 876 current to 1200 planned students). To be confirmed by a Sydney Water Coordinator (S73 process)
6.3.2	Sanitary drainage systems	Relocation and/or upgrading of internal sanitary drainage infrastructure required to support proposed development	Almost Certain	• Significant new works required to connect new sanitary drainage provisions at new / back-converted building to existing sanitary drainage infrastructure. • Minor diversions to existing pipework within the site are likely to be required. • Other unaffected existing internal sanitary drainage infrastructure is not likely to require upgrading.
6.3.3	Network Utility Operators water	Existing external potable water supply infrastructure servicing site not able to support proposed development	Likely	• Upgrade to external water supply infrastructure may be required to support proposed development at this site (increase from 876 current to 1200 planned students). To be confirmed by a Sydney Water Coordinator (S73 process)
6.3.4	Cold water services	Relocation and/or upgrading of internal potable water reticulation infrastructure required to support proposed development	Almost Certain	• The proposed works will require the existing 32mm water supply will require to be amplified to a 50mm water connection, meter and backflow prevention device. • In the short term, the current water meter assembly is sagging and will require to be modified.
6.3.5	Network Utility Operators gas	Existing external gas supply infrastructure servicing site not able to support proposed development	Possible	• Upgrade to external gas supply infrastructure possibly required to support proposed development at this site.
6.3.6	Gas services	Relocation and/or upgrading of internal gas reticulation infrastructure required to support proposed development	Almost Certain	• The existing gas supply conveys to numerous gas heaters located within classrooms around the campus. It is understood that the future heating provisions to classroom will be undertaken via the reverse heating cycle on the air conditioning system. • The existing gas supply will require to be amplified to provide a central hot water plant for the proposed new building layouts.
6.3.7	Wet fire services	Compliance / capacity issues associated with existing wet fire services affected by proposed development	Almost Certain	• The existing hydrant pipework will require to be extended and provide a minimum of two additional hydrants. • External signage to the existing fire hydrant booster assembly, in accordance with AS 2419 is not currently displayed and non-compliant with AS 2419. • No permanent Fire Hydrant block plan was displayed, which is non-compliant. A laminated block plan was located at the bottom of the booster assembly enclosure; this was incomplete and did not display the flow and pressure testing data. • The location of the existing fire hydrants on campus is non-compliant - being located less than 10m to the building(s). • The hydrant opposite Block B is non-compliant being less that 750mm above FFL and will require to be raised in height. • A fixed on-site fire pump is required to boost pressures. Should the authority water main flow rates not be met, an on-site storage tank will be required.

Item		Risk / Constraint / Issue	Likelihood	Summary and Recommendations

6.3.8	Dry fire services	Compliance / capacity issues associated with existing dry fire services affected by proposed development	Almost Certain	• Existing assets include smoke detectors, which appear to be in good condition.
				• The following items were identified as not currently installed:
				  ○ Fire Indicator Panel,
				  ○ Break glass alarm,
				  ○ Fire bells,
				  ○ Occupant Warning System.
				• Allow for new provision of all dry fire services required to support proposed development.

6.3 Electrical & ICT Services

Table 9 Summary and Recommendations – Electrical and ICT Services

Item		Risk / Constraint / Issue	Likelihood	Summary and Recommendations
6.4.1	Availability of power requirements from the local supply authority and the electrical reticulation within the school	Existing external electrical supply to site not able to support proposed development	Almost Certain	• Upgrade to Endeavour Energy external electrical supply likely to be required to support proposed development at this site • Allow for provision of new supply substation servicing the site
6.4.2	Existing site electrical infrastructure services, including location, routes and any notable non-compliances	Compliance issues associated with existing internal site electrical infrastructure affected by proposed development	Almost Certain	• The site capacity is 400amps. In accordance with NSW Department of Education – EFSG – DG61 Electrical Services minimum service / consumer mains will need to be rated at 800amps for 1000 students.
6.4.3	System site electrical infrastructure configuration and capacity/spare capacities or expansion capabilities	Configuration / capacity issues associated with existing internal site electrical infrastructure affected by proposed development	Almost Certain	• The main switchboard is located in Building B main switchboard room, the MSB was installed in 2008. Access to the MSB is from the south end of the building. Service protection device (SPD) at MSB is rated at 400A • A new main switchboard will be required for compliance with the NSW service and installation rules if a new supply is installed. • The main switchboard will need to be within 50m of the Endeavour Energy point of connection. • A new building to house the main switch board may be required. Modifications will be needed to the main site switchboard. In ground works and excavation will be required • Significant works required to reticulate new electrical power to proposed new / back-converted buildings.
6.4.4	Availability of Telecommunications provisions from the local telco providers	Existing external communications service to site not able to support proposed development	Unlikely	• The school's main server and communication racks are located in building D (Library) • The incoming supply is NBN fibre and will likely have sufficient capacity to cater for the replacement of the demountable classrooms to new permanent classrooms • Upgrade to external communications service not likely to be required to support proposed development at this site
6.4.5	Existing site communication infrastructure services, including location, routes and any notable non-compliances	Compliance issues associated with existing internal site communications infrastructure affected by proposed development	Almost Certain	• Existing communications room infrastructure not compliant with requirements of DG63 • Proposed development likely to trigger requirement to upgrade existing communications room to comply with DG63 – subject to further decision making by Department of Education

Item		Risk / Constraint / Issue	Likelihood	Summary and Recommendations
6.4.6	System site communication infrastructure configuration and capacity/spare capacities or expansion capabilities	Configuration / capacity issues associated with existing internal site communications infrastructure affected by proposed development	Almost Certain	• Possibility of back conversion of Building D (library) which houses the main server rack, access to this server room need to be considered after the back conversion. • During the construction stage of the back conversion of Building D, power supply and communication system within the main comms room to be un-interrupted and dedicated access to the comms room required. • A new rack may be provided in the main server room if the existing main server rack is fully occupied, this is to be determined in detail designed stage • Significant works required to reticulate new communications connections to proposed new building.