CONSULTANTS

Suite 2, Level 1
33 Herbert Street
ST LEONARDS NSW 2065

PO Box 292
ST LEONARDS NSW 1590

T 02 9438 5098
F 02 9438 5398

www.acor.com.au

ENGINEERS

MANAGERS

INFRASTRUCTURE
PLANNERS

DEVELOPMENT
CONSULTANTS

Saints (Ss) Peter & Paul Assyrian Primary School

Assyrian Schools Ltd

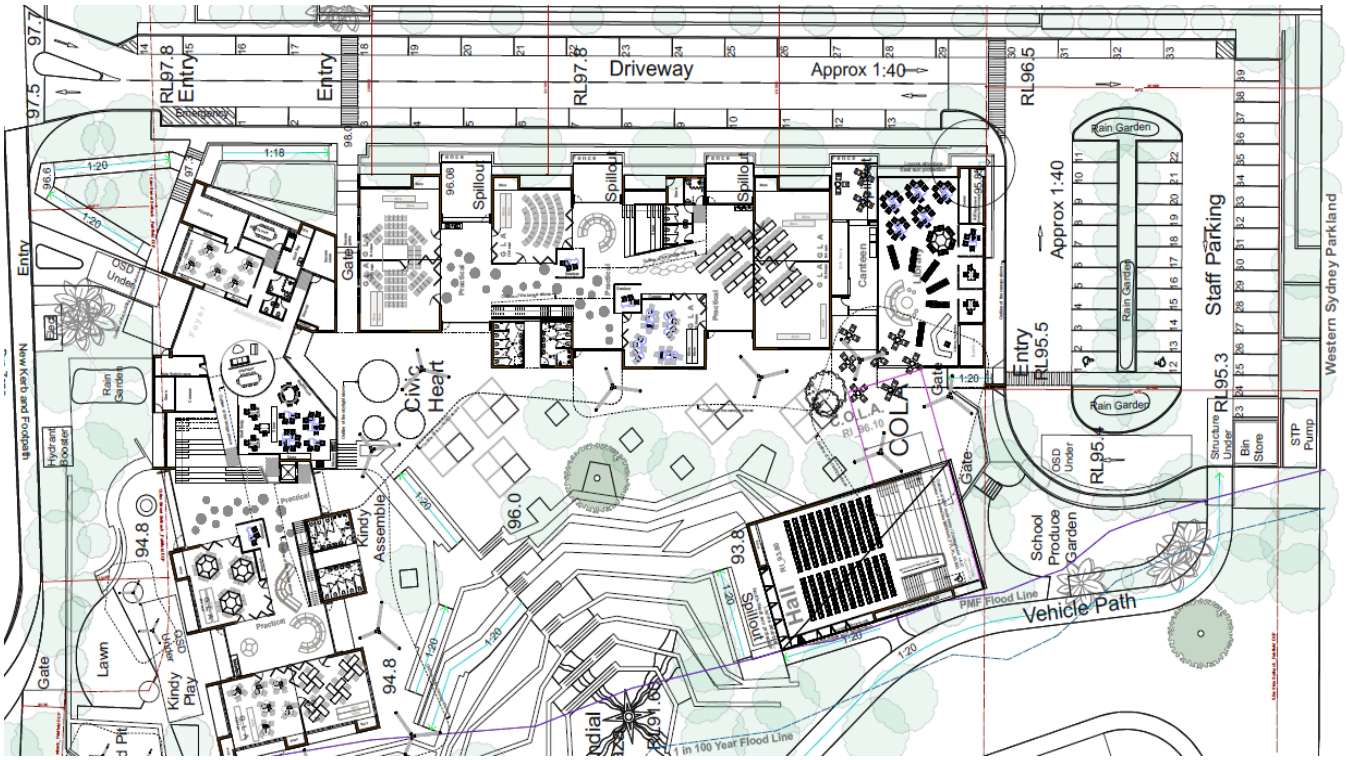
17-19 Kosovich Place, Cecil Park, NSW 2178

Mechanical and Hydraulic Services Infrastructure Assessment Report and Water Management Plan for State Significant Development Application

Prepared for: Assyrian Schools limited

Project No: SY180261

Issue No: 02



Disclaimer

This Report has been prepared in accordance with the scope of services described in the contract or agreement between ACOR Consultants Pty Ltd and the Client. The Report relies upon data, surveys, measurements and results taken at or under the particular terms and conditions specified herein. Changes to circumstances or facts after certain information or material has been submitted may impact on the accuracy, completeness or currency of the information or material. This Report has been prepared solely for use by the Client, ACOR Consultants Pty Ltd accepts no responsibility for its use by other parties without the specific authorisation of ACOR Consultants Pty Ltd. ACOR Consultants Pty Ltd reserves the right to alter, amend, discontinue, vary or otherwise change any information, material or service at any time without subsequent notification. All access to, or use of, the information or material is at the user's risk and ACOR Consultants Pty Ltd accepts no responsibility for the results of any actions taken on the basis of information or material provided, nor for its accuracy, completeness or currency. Any reference to "Report" where used in this Disclaimer is also a reference to any plan, table, data or other document that has been created for the purposes of the "Report" and referred to in the "Report"

REVISIONS

Revision	Date	Purpose	Prepared By	Approved By
01	17/08/18	Initial Issue	Rob Gruber	W Meadows
02	20/08/18	Final Issue	Rob Gruber	W Meadows
03	21/08/18	Final Issue	Rob Gruber	W Meadows

Contents

1 Executive Summary

This report addresses overall the available waste water and potable water infrastructure and mechanical systems for the proposed Assyrian Schools limited development project located at 17-19 Kosovich Place, Cecil Park, NSW, which includes the staged construction of:

- Stage 1 –2 storey corner element of the GLA Blocks with Admin, Staff and 9 No. GLAs and associated shared practical areas (max student number 210 + 12 staff).
- Stage 2 – continuation of the Stage 1 GLA Blocks to the south, with a further 6 No. GLAs = 15 GLAs in Total (max student number 240 + 25 staff).
- Stage 3 – continuation of the Stage 1 GLA Blocks to the west (along the street front), with a further 6 No. GLAs = 21 GLAs in Total (max student number 630 + 35 staff).
- Stage 4 – addition of the Canteen and Library.
- Stage 5 = addition of the Multi-Purpose Hall.

2 Introduction

The following report has been prepared by ACOR Consultants to support the State Significant Development Application prepared by PMDL Architects for the proposed development by Assyrian Schools limited. The development is located at 17-19 Kosovich Place, Cecil Park, NSW 2178 and consists of an independent, co-educational, primary school (Kindergarten to Year 6).

This report covers building engineering services – Mechanical and Hydraulic– and is based on Secretary's Environmental Assessment Requirements (SEARs) for application and the associated Schematic Design drawings, briefing documents and subsequent ancillary information provided.

Scope of services covered within this infrastructure and water management report include:

- Sanitary and trade waste discharge
- Roof water plumbing and drainage systems connecting to existing civil trunk stormwater
- Domestic potable water supply systems
- Water supply for firefighting purposes

Scope of services **not covered** within this report include:

- Electrical and telecommunications infrastructure (Refer electrical engineer's report)
- Waste water collection, storage, treatment and effluent discharge (Refer civil engineer's report)
- Trunk stormwater collection, retention, water quality management and discharge to Council approved connection point. (Refer civil engineers report)
- Natural gas.

3 Mechanical Services

3.1 Ventilation

Ventilation measures are mandatory by NCC/BCA provisions.

Where natural options are insufficient, mechanical ventilation measures (as referenced in NCC/BCA) will be provided to all habitable spaces.

All classrooms, and common area shall be provided with mechanical ventilation compliant to AS1668.2 through local in-ceiling air-to-air heat recovery units and façade penetrations for each level, to ensure adequate fresh air for each classroom whilst minimizing energy consumption of tempering fresh air.

3.2 Air Conditioning

Assyrian Schools Limited have elected to provide air-conditioning (AC) to all classrooms, teaching spaces, library, Multi-Purpose Hall, Administration and staff areas.

The proposed buildings will be provided with air-cooled “packaged” type air conditioning units. This will comprise a series of Variable Refrigerant Flow (VRF) style units which includes individual internal Fan Coil Units (FCU) – one per air-conditioned zone – interconnected by refrigerant pipes to a series of external Condensing Units (CU) where heat energy is reject (cooling) or absorbed (heating) from the atmosphere.

The AC systems will be controlled by manual ‘On’ Switches in each GLA and will turn Off automatically, controlled by motion detectors in each GLA.

Condensing Units shall be predominantly located on level 1 allocated plant decks. Locating CUs and packaged system on roof levels was rejected due to spatial restrictions, complexity of the roof forms and safety in design considerations.

In general, internal FCUs and their associated ductwork and pipework shall typically be concealed above ceiling linings. Outside air will be ducted to FCUs via dedicated energy-saving, heat recovery units to provide consistent ventilation.

3.3 Amenity Area Exhausts

Amenities areas shall be provided with mechanical exhaust provisions to AS1668.2 requirements.

Typically, exhaust air is collected at ceiling level within sheetmetal ductwork and fan-forced through to roof above.

It has been deemed acceptable for amenities areas to penetrate through vertical façades of the roof.

Make-up air is typically drawn from adjacent corridor and outdoor spaces.

Control of amenities exhaust systems shall be coordinated with electrical lighting where necessary and motion sensors in each area.

3.4 Service Room Exhausts

Switchroom(s) / Comms room(s) / Plant rooms and the like shall be provided with mechanical exhaust through ceiling concealed ductwork, local exhaust fans and exhaust air discharge via local facades. Make up air shall be typically sourced through door grilles or other transfer grilles.

Comms Room(s) shall be provided with one dedicated, wall-mounted, split type AC system for temperature control purposes. It is assumed that these are non-habitable spaces and no ventilation measures are proposed. Comms Room AC systems are independent of comfort AC systems allowing the latter to stop when areas are vacated.

3.5 Building Materials and Thermal Envelopes

Roofs, (suspended) floors and walls forming part of the thermal envelope of the building are to be provided with insulation to achieve the required NCC Part J1 Building Fabric performance requirements as a minimum.

During detailed design, an assessment of opportunities for alternative solutions via NCC JV3 Verification Method will be made. This may evaluate the thermal, operational and cost effectiveness of options for – say – changes in insulation to floors, walls and roofs.

Insulation measures will also likely be required for acoustic performance requirements both external and to adjacent internal spaces. These are likely to assist with required thermal performance measures.

4 Hydraulic Services

Hydraulic infrastructure existing at 17-19 Kosovich Place, Cecil Park only includes incoming domestic cold-water supply from a Sydney Water DN100 Ductile Iron Cement Lined (DICL) water main in Kosovich Place. Contractors will lodge applications with Sydney Water at appropriate times to suit the construction program.

The details of proposed infrastructure work to accommodate the school are as follows:

4.1 General

- Domestic cold water and fire water will be fed from the authority main located in Kosovich Place adjacent to the main entry of the school. Application will need to be made to Jemena and Sydney Water for final authority connections approval.
- Application to Sydney Water for the available pressure and flow within the watermain fronting adjacent to the property indicates the 100mm main in Kosovich Place has a maximum flow of 26L/sec at 140kPa. This will provide adequate flow for hydrant operations envisaged however, a booster pump would be required to provide the minimum required operating pressures for the Fire Brigade.
- A Sydney Water sewer connection is not available in the vicinity. For final connection refer to Civil documents for details.
- The required Section 73 application will be submitted to Sydney Water once the State Significant Development Application (SSDA) is lodged, to determine if any Sydney Water Infrastructure upgrades are required to service the development.
- The required Sydney Water Building Plan Approval (BPA) will be applied for prior to application for Construction Certificate.
- Sanitary fixtures and fittings shall be WELS rated with minimum 4-star water efficiency index, except showers where minimum 3 star will be achieved.
- External hose taps will be vandal proof type to minimize water wastage.
- General student tapware will be time control type, to minimize water wastage.

4.2 Cold Water

- A Dial Before You Dig (DBYD) search has been performed and results indicate there is a 100mm Ductile Iron Cement Lined (DICL) water main in Kosovich Place. The 100mm diameter DICL main in Kosovich Place has adequate flow and pressure to satisfy the domestic water supplies.
- Water supply pressure and flow on site testing, during site construction establishment, will be performed to verify Sydney Water modelling calculations received.
- Site and Zone containment backflow prevention will be provided in accordance with AS3500 and Sydney Water requirements.
- The domestic water services will be located inside the building and reticulate within the ceiling space to serve each wet area.
- All potable and non-potable water services will be designed in accordance with AS3500.1-2015.

4.3 Hot Water

- Various options for generation and reticulation of Domestic Hot Water (DHW) are to be investigated further throughout the detailed design phase. As wet areas are not centralised there is an option to install multiple small hot water plants to avoid unnecessary heat loss through the

system. Hot water will be generated from electric elements whilst an allowance for potential, future, solar-thermal hot water preheat will be included.

- Insulation will have a zero flame and smoke index and be minimum 25mm thick with an R value of 0.6 for all hot water flow and return pipework.
- Dead legs in the hot water system branch lines shall be minimised where to ensure estimated maximum wait time for hot water to be 20 seconds.
- Approved thermostatic mixing valves (TMVs) shall be installed throughout the school to regulate the temperature of the hot water to avoid the risk of scalding. A maximum temperature of 42°C is to be available at all ablution fixtures.
- All hot / warm water will be designed in accordance with AS3500.4-2015 and NSW legislation.

4.4 Sanitary Plumbing and Drainage

- The school's sewer drainage will be a gravity system connecting to the sewer pit to be connected to sewage treatment plant and effluent disposal system, located at the south side of the property. Refer to Civil documents for details.
- A sanitary drainage system will drain all sanitary fixtures, floor wastes, tundishes, mechanical condensate drains and the like and gravitate to the sewage treatment collection pit.
- All sanitary plumbing and drainage will be designed in accordance with AS3500.2-2015.

4.5 Stormwater

- All roof water plumbing shall discharge into the in-ground stormwater system. Refer to Civil documents for details.
- All roof water plumbing will be sized to cater for:

  1 in 100 year 5-minute rainfall intensity for box gutters and associated downpipes

  1 in 20 year 5-minute rainfall intensity for eaves gutters and associated downpipes.
- A rain water re-use tank has been proposed with a target capacity of approximately 140,000L to collect roof water for irrigation purposes only (Excluding treated effluent disposal areas)

  Filtration and disinfection of stored rainwater will be provided to provide "Safe Grade A" recycled water supply.
- Refer to civil engineer's report for site overland flow, inground stormwater, water sensitive urban design details and flood level information.
- All roof and stormwater drainage connecting civil trunk drainage systems will be designed in accordance with AS3500.3-2015.

4.6 Trade Waste Drainage

- Trade waste pre-treatment for cooking, laboratory and other designated trade waste will be incorporated prior to discharge to the internal sanitary drainage in accordance with Sydney Water trade waste guidelines and achieve a trade waste agreement for the operation and maintenance of the pre-treatment systems prior to building(s) occupation certificate
- A High-Density Polyethylene (HDPE) trade waste plumbing and drainage system will be installed to cater for the trade waste expected for the canteen area.
- All trade waste will be designed in accordance with AS3500.2-2015 and Sydney Water trade waste requirements.

4.7 Fire Hydrant Services

- An on-site fire hydrant system fed from the 100mm diameter Sydney Water main in Kosovich Place will be installed to provide code compliant fire hydrant protection to the school. Fire hydrants will generally be located outside and installed so that all portions of the building shall be within reach of a 60m hose length and 10m hose stream.
- A fire hydrant booster assembly will be located within sight of the main school entry to comply with the current standards. Booster assembly is to be constructed and commissioned.
- An end suction diesel-powered fire hydrant pump will be provided to satisfy the minimum pressure and flow requirements outlined in AS2419.1-2005. The pump room will be accessible directly from open space.
- The fire hydrant service will be designed in accordance with NCC Volume 1-2016, AS2419, NSW Rural Fire Service (NSWRFS) and NSW Fire and Rescue requirements.

4.8 Fire Hose Reel Service

- A system of fire hose reels will be connected to the metered domestic cold-water system which is supplied from the existing 100mm diameter Authority water main located in Kosovich Place.
- Section E1.4 of the NCC Volume 1-2016 states that fire hose reels are no longer required in “classrooms and associated corridors in a primary or secondary school.” Staff rooms, store rooms and administration areas within the building may require fire hose reel protection as these areas are not considered classrooms or corridors.

5 Authority Consultation

5.1 Sydney Water Statement of Available Pressure and Flow

Statement of Available Pressure and Flow

Sydney WATER

Olivia Henry
33 Herbert St
St Leonards, 2065

Attention: Olivia Henry Date: 18/05/2018

Pressure & Flow Application Number: 437449
Your Pressure Inquiry Dated: 2018-04-24
Property Address: 19 Kosovich Pl, Cecil Park 2178

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: Kosovich Place	Side of Street: South
Distance & Direction from Nearest Cross Street	325 metres West from Wallgrove Road
Approximate Ground Level (AHD):	99 metres
Nominal Size of Water Main (DN):	100 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	59 metre head
Minimum Pressure	52 metre head

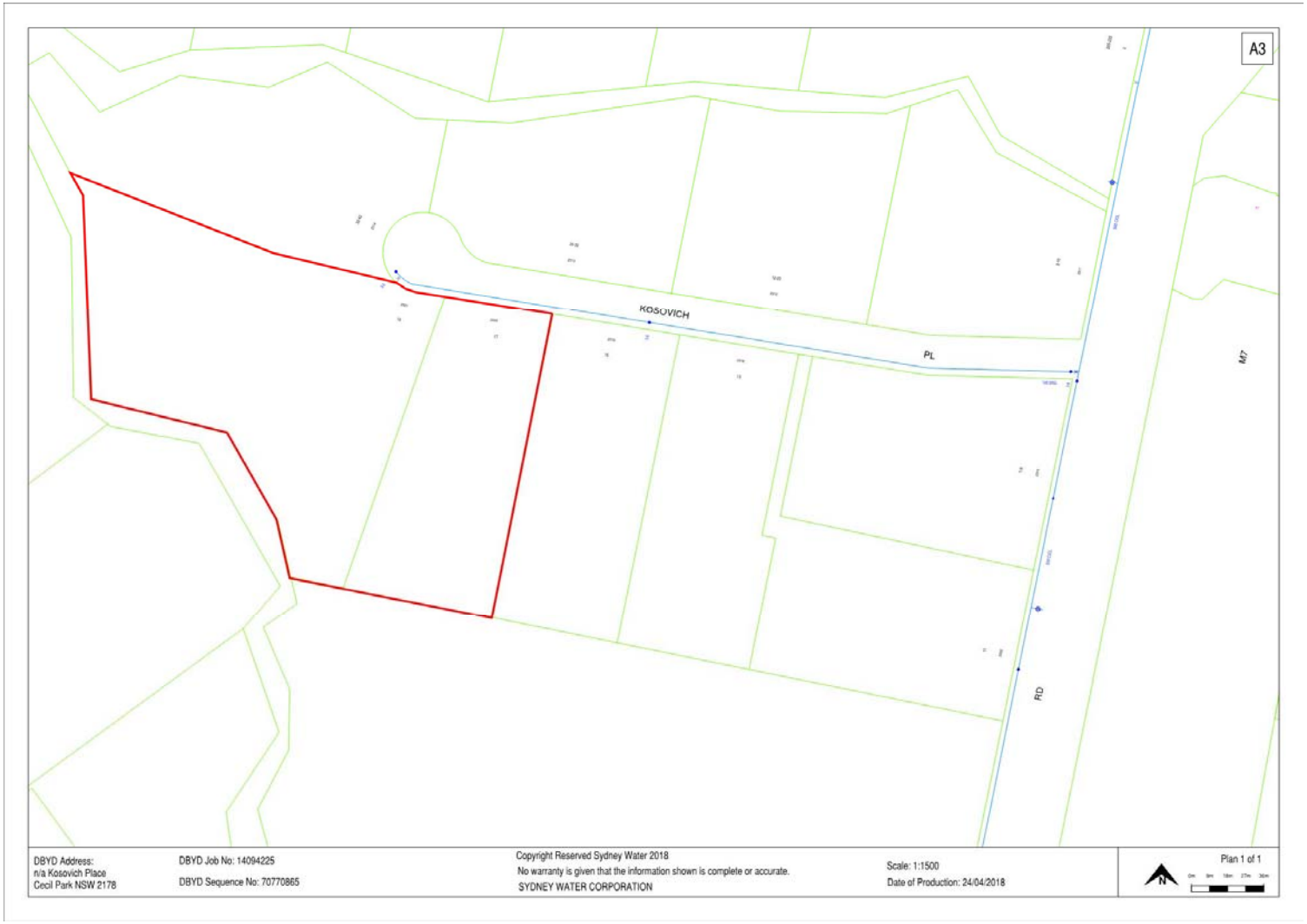
WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	52
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20	51 47 40 30
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5 10 15 20	50 46 39 29
Maximum Permissible Flow	26	14

(Please refer to reverse side for Notes)

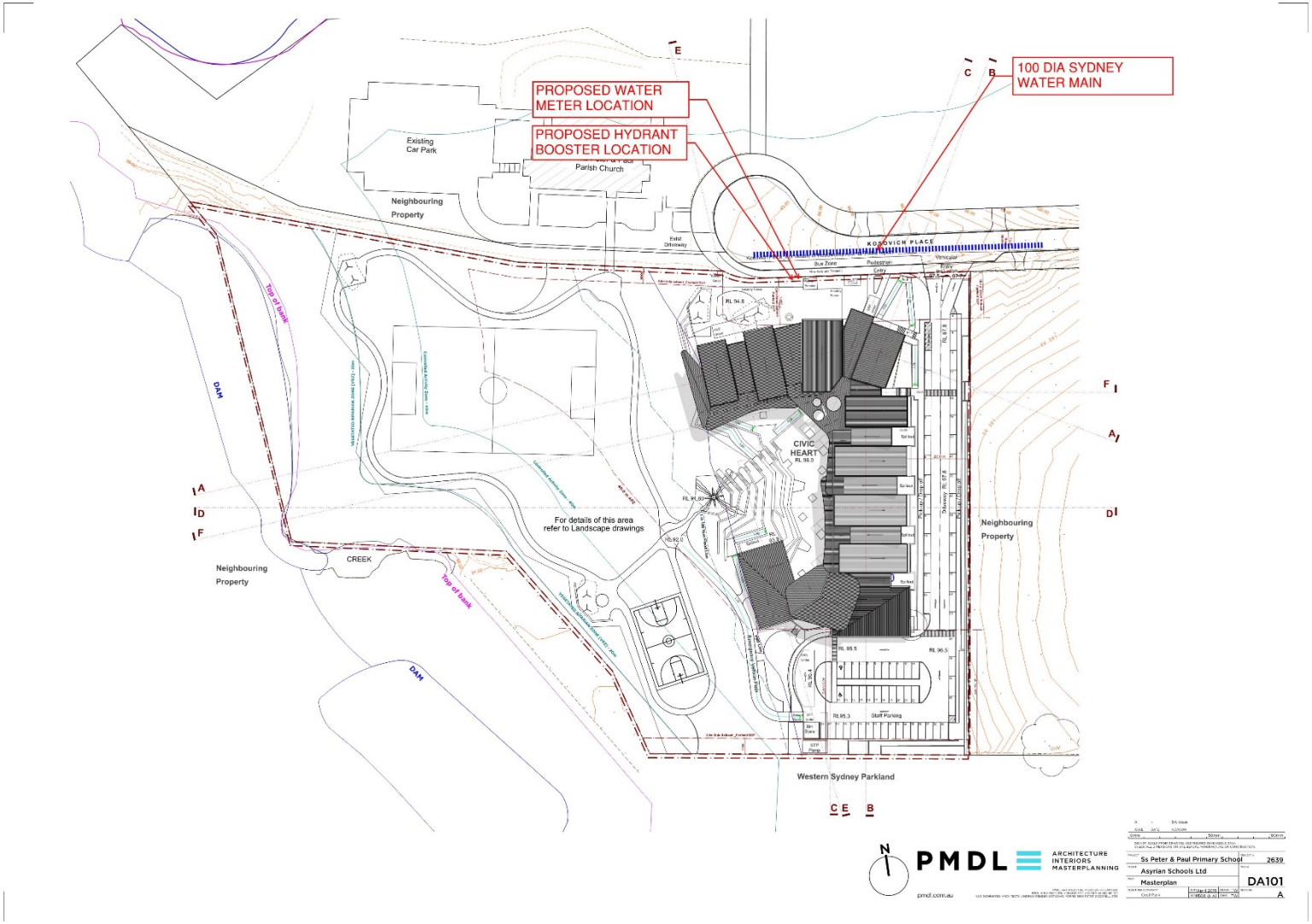
For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

5.2 Sydney Water Diagram



6 Water Supply Site Plan



7 Rainwater Tank Sizing Calculation

Rainwater Tank Sizing Estimates

Date Prepared: 18/07/2018

Project Name: Ss Peter & Paul Assyrian Primary School **Project Number:** SY180261

Project Information

Roof Area to rainwater tank
2000 m2

Rainfall Data Location

Cecil Hill

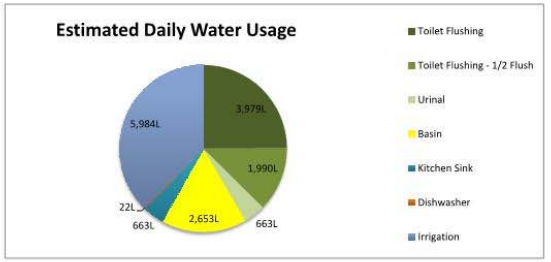
Price of Water in Sydney Per Kilolitre = $2.08 2018 - Sydney Water Price

Estimated Population Figures

630 Students 35 Staff

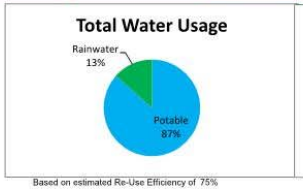
Rainfall Data History	2000-2018	Years of data recorded
Water Captured Annually =	1,674,000L	90% of Average Annual Rainfall Capture
Water Captured Monthly =	**139,500L**	**Average Monthly Rainfall Capture**
Water Captured Monthly =	298,000L	Based on wettest month
Water Captured Monthly =	80,000L	Based on driest month

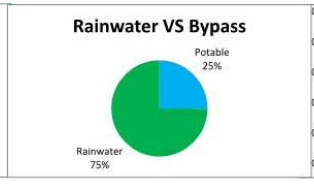
This information is calculated from statistics provided by the Bureau of Meteorology indicating average rainfall for a given area



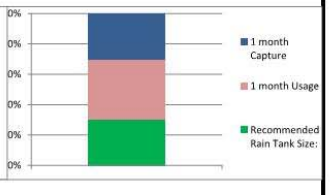
Water Used	WC - Full	WC - Half	Urinal	Basin	Kitchen Sink	Dishwasher	Irrigation
Litres of Water Per Usage	6L	3L	1L	2L	10L	15L	6000L
Days used per week	7	7	7	7	7	3	7
Typical usage per Person Per Day	1	1	1	2	1	1	1
Number of people	665	665	665	665	66.5	3.5	1
Total Usage Per Person in one year	2184	1092	364	1456	3640	2340	2184000
Total Usage in one year	1452360L	726180L	242060L	968240L	242060L	8190L	2184000L
KiloLitres of Water Per Year	1452KL	726KL	242KL	968KL	242KL	8KL	2184KL
KiloLitres per month	121KL	61KL	20KL	81KL	20KL	1KL	182KL
	MAINSWATER	MAINSWATER	MAINSWATER	MAINSWATER	MAINSWATER	MAINSWATER	RAINWATER

Total amount of Mainswater used Annually	12,156,690L	12157KL	*This is if all fixtures are run off Mains water*
Total amount of Rainwater used Annually	2,184,000L	2184KL	*Based on selected fixtures*
Total Annual Cost of Mains Water	$25,286		
Total Annual Maximum Rainwater Savings	$4,543		
Potential Annual Rainwater Savings(Fixture Usage)	$4,543	Based on Rainwater re-use fixtures used	
Potential Annual Rainwater Savings(Rainfall Capture)	$3,482	Based on rainfall captured achieving 100%	
Predicted Annual Water Cost (With Rainwater Savings)	**$21,816**		
Predicted Annual Rainwater cost saving	**$3,469**	**This does not include rainwater maintenance!**	





Based on estimated Re-Use Efficiency of 75%



IRRIGATION USAGE ESTIMATES					
	m²	L/m² Per week	Weekly Usage (L)	Weekly Usage(m³)	Monthly Usage (m³)
Communal lawn areas	3000	25	75000	75	300
				Total	300

Efficiencies

January	February	March	April	May	June	July	August	September	October	November	December
75%	83%	75%	77%	75%	77%	75%	75%	77%	75%	77%	75%

75% Per Year

Overflow Water

159,000L	91,000L	L	11,000L	L	133,000L	L	L	L	L	15,000L	L

1,860KL Per Year **78% Annual Overflow Reduction**

Recommended Rain Tank Size: 139,000L

Based on Average Monthly usage vs average monthly capture

139,500L 1 month Capture

182,000L 1 month Usage

Note: Rainwater Tank sizing is not an exact science and has been based on information compiled over time within our office. If rainwater tank is full at time of rainfall event then no rainfall can be captured.