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Richard Buckminster Fuller

Mechanical Engineering
Lighting Design
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Mechanical and Electrical Services Schematic Design - Net Zero Energy Statement

Sutherland Public School Hall (SPSH), NSW

This Net Zero Energy Statement accompanies an Environmental Impact Statement (EIS) pursuant to Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act), in support of a Review of Environmental Factors (REF) Application for the proposed Sutherland Public School Hall, located 38-54 Eton Street, Sutherland NSW 2232.

This Net Zero Energy Statement has been prepared to address the relevant requirements under Section 3.4 of the NSW Sustainable Buildings State Environmental Planning Policies (SB SEPP) 2022, as defined under Section 35C of the Environmental Planning and Assessment Regulation 2021 (EP&A).

This statement addresses the Secretary’s Environmental Assessment Requirements (SEARs) issued for the project, notably:

Ref. No.	SB SEPP Requirement	Section of Statement where response is provided
3.4	In deciding whether to grant development consent to development to which this section applies, the consent authority must consider whether the development will minimise the use of on-site fossil fuels, as part of the goal of achieving net zero emissions in New South Wales by 2050.	This Net Zero Energy Statement addresses this item.

We note that Steensen Varming are only engaged up to the completion of the Schematic design phase.

The following initiatives have been included in the design; however, it remains the responsibility of the appointed design and construct contractor to ensure these initiatives are designed in detail and implemented during the construction phase.

While the mechanical and electrical services have been designed to be fossil fuel-free by way of being all-electric systems, it remains the responsibility of School Infrastructure NSW (SINSW) to procure 100% renewable electricity in enabling a net zero emissions operation. This is in accordance to the NSW Department of Education’s commitment to sustainability and net zero emissions in operation as per goal-5 of their “[Our 9 goals to 2030](#)” initiative.

This allows the project to be capable of operating at net zero emissions once 100% renewable electricity is procured by Schools Infrastructure NSW, in line with the 1st January 2030 target, set out by NSW Department of Education (NSW DoE) and the SB SEPP target set out for 1st Jan 20250.

Sydney, 20th December, 2024
Ref. No. 247069 CER S00 [00]

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Director

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On-site Fossil Fuel Usage

The mechanical and electrical services strategy for the proposed activity has been designed to be all-electric from day 1 of operation. Also, all refrigerants for the mechanical systems are specified to have an Ozone Depletion Potential (ODP) of zero.

The electrical services design incorporates electric power outlets to serve the following equipment (provided by others) - domestic hot water heaters and kitchen equipment.

Passive Design Features

The following passive design features have been integrated in order to minimise energy consumption.

- The buildings' orientation is considerate of the site's constraints, solar exposure, and overall functionality requirements.
- The shading strategy has been developed in respect to the buildings' orientation and to minimise unwanted heat gains and associated energy consumption. The external shading design has aimed at maximising glare-free daylight ingress and as a result reducing the use of artificial lighting, use of cooling, and these systems' energy consumption.
- The façade has been designed in consideration of:
 - Daylight provision to all spaces to improve visual comfort and in minimising the use of artificial lighting. Detailed daylight simulations have been undertaken as part of the Environmental Sustainability Design (ESD) scope of works, to document daylight compliance with regulations and EFSG V2.0 guidelines. Around 57% of the primary occupied space is designed to receive at least 160 lux due to daylight, for around 80% of the nominated hours.
 - Efficient natural ventilation for the main hall to improve thermal comfort, indoor air quality, and to reduce the use of mechanical ventilation, thereby reducing energy consumption. The natural ventilation to the main multi-purpose hall is provided through the use of louvres, windows, and doors, with an effective opening area of minimum 6.25% of the floor area being served.
 - Building envelope designed for at least 10% improvement in thermal performance over the minimum compliance requirements of Section-J of the National Construction Code (NCC) 2022.

Technical Design Features

The following technical design features have been integrated into the design to minimise energy consumption.

- The air-conditioning system for the small office spaces is a variable refrigerant type of system which is considered the most suitable solution for the required space, and which delivers good efficiencies, particularly at lower thermal loads.
- To supplement the natural ventilation strategy for the main hall, ceiling mounted fans are to be installed to implement a mixed mode ventilation strategy to ensure thermal comfort during peak summer days.
- The mechanical ventilation system applies CO₂ monitoring in all spaces to activate the fans upon exceedance of the CO₂ threshold. This approach works in conjunction with the natural ventilation strategy in providing a high level of indoor air quality and a smooth transition between natural and mechanical ventilation, leading to reduced energy consumption.

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- The lighting fixtures are highly efficient LED (Light Emitting Diode) technology and the lighting for the main hall space will be programmed for automatic control.
- The lighting control system and related lighting equipment are to facilitate various moods and provide high flexibility and adaptability to cater for different uses and events and future changes in function. Time switches, occupancy sensors and photo sensors are suggested to be used to control lighting when and where appropriate.
- An Energy Monitoring System (EMS) will be applied to monitor the energy usage across the project. The energy and water usage data are available to staff and can be used to inform the students thereby assisting in their understanding of their consumption patterns, leading to improved, more resource-conscious user behaviour.

Renewable Energy Generation and Storage

The following initiatives have been implemented for the project's energy generation and storage capabilities.

- A 25-kW rated rooftop photovoltaic (PV) system has been designed to provide a portion of the project's electricity usage.
- Furthermore, a spatial allowance has been made to ensure a total of 20% of the roof space (including the above) is available for future PV installation, on each building.
- The main switchboard has been designed to allow for future battery installation.
- The PV supply is connected to the main switchboard so the surplus energy, if available, could be shared with adjacent buildings.



Chris Arkins

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Evidence

The following evidence has been provided to demonstrate electricity as the fuel source for mechanical services.

Document Reference Number	Description
Sutherland Public School – New Hall Mechanical Services Schematic Design Report	Excerpt from Mechanical Design Report outlining the HVAC system description, as being all-electric. Domestic hot water usage. No gas usage.

Excerpt from the Mechanical System Descriptions report.
Reference: ‘Sutherland Public School – New Hall Mechanical Services Schematic Design Report’
Date: 20/12/2024
Revision: 0
Author: Alan Sharkey, Senior Associate, Steensen Varming

3.0 Mechanical Services

3.1 Mechanical Systems Overview

A summary of the mechanical systems serving this building are as follows:

Systems	Description (serving the Hall)
Air conditioning systems	Admin office/kitchen areas: Cassette type heat VRF reverse cycle heat recovery system air conditioners providing simultaneous heating and cooling. High heat Load rooms/ Communications rooms: Dedicated DX air conditioning split systems. These systems require outdoor plant space for their associated outdoor condenser units.
Smoke hazard management system	The stage currently has an area less than 50m². Therefore, does not require a dedicated smoke exhaust system. Mechanical systems will shut down in accordance with NCC and AS 1668.1 requirements.
Heating only systems	Hall: Electric radiant panel heaters. Stage: Electric radiant panel heaters
Mechanical Ventilation systems	A dedicated outside air supply grilles will be provided adjacent to indoor cassette type units when the flow rate is above 20 l/s due to the limitations of the direct duct connected size. Where outside air is shared over multiple indoor units a mechanical assisted fan and filter ventilation system will be provided. Toilets, Stores, PV cupboard, Communications rooms, Kitchen hoods: Mechanical extract ventilation systems will be provided in accordance with AS1668.2.
Natural ventilation	Natural ventilation is provided to the Hall. The windows/louvres will be manually operated except for any high-level openings in the hall. Opening must be based on the effective opening areas and not the structural openings.
Controls	1X weather and VOC stations, CO2 monitoring sensors, VOC sensors in selected areas. (Any energy metering and monitoring will be captured as part of the electrical services scope).