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SUSTAINABLE DESIGN

STEENSEN VARMING



Nepean Hospital and Integrated Ambulatory Services Redevelopment

SSDA Environmentally Sustainable Design (ESD) Report



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1.0 Executive Summary

This report has been prepared by Steensen Varming for inclusion in the Development Application submission for the Stage 1 Building.

The key intent of this report is to provide a response to the Environmentally Sustainable Design (ESD) criteria stated in the project Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development application number 8766.

The SEARs were issued by the Department of Planning and Environment on 22.11.2017, and include of the following requirements for energy efficiency and ESD:

6. Ecologically Sustainable Development (ESD)

Item	Secretary's Environmental Assessment Requirements	Project Response
1	Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the development.	The ESD initiatives proposed for the Stage 1 Building project aims to reduce the environmental impacts typically associated with buildings during the construction and ongoing operation of the building. The project will incorporate initiatives to reduce resource consumption. This approach aligns with the ecological sustainable development principles of Clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. Refer to section 2.0 for the proposed ESD initiatives.
2	Demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice.	The Stage 1 Building will target an aspirational 4 Star Green Star rating as required under Health Infrastructure's Engineering Services Guidelines (ESG).
3	Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.	Refer to section 2.0 for the proposed energy, water and Water Sensitive Urban Design (WSUD) initiatives.

Further to the SEAR's, the following targets and guidelines have been used for the development of the ESD initiatives:

- Health Infrastructures Engineering Services Guidelines (GL2016_020 August 2016); and
- National Construction Code (NCC) Section J 2016 requirements;

2.0 Environmental Sustainable Design (ESD) Initiatives

This section provides an overview of the ESD initiatives considered for the Stage 1 Building in response to the Secretary's Environmental Assessment Requirements for State Significant Developments.

The ESD initiatives have been categorised under the following sustainable building design categories:

- Energy conservation;
- Water conservation; and
- Water Sensitive Urban Design (WSUD).

A list of target initiatives related to environmentally preferred materials, construction, operations is currently being developed by the design team in consultation with the Architect and stakeholders.

The ESD initiatives proposed within will ensure the SEARs and targets/benchmarks discussed in the previous section (section 1.0) are met.

2.1 Energy Conservation

This section captures the passive, mechanical and lighting design measures considered for the Stage 1 Building in reducing energy consumption. The approach in reducing energy consumption aligns with the ecological sustainable development principles of Clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

- **Passive design principles** will be employed to respond to environmental conditions of the building including orientation, solar access, prevailing winds, seasonal and diurnal temperatures changes. The passive design principles considered for the Stage 1 Building include:
 - o Increased thermal insulation R-values for roofs and walls;
 - o Appropriately sized façade glazing area to achieve a balance between heat losses/gains and the natural daylighting and views;
 - o Double glazed window units with a low system U-value;
 - o Appropriate solar control glazing performance, to achieve a balance in controlling solar heat gains whilst not diminishing the quality of daylight and views;
 - o Integrated façade shading; and
 - o Internal blinds.

The passive design measures will also facilitate improved occupant comfort, such as the following:

- o Daylighting – The façade design will be designed to achieve good levels of natural daylighting.
 - o External views – will be provided to help to improve wellbeing of occupants and patients.
 - o Glare - will be reduced through a combination of integrated façade shading, window performance and internal blinds.
 - o Thermal comfort – higher levels of construction R-value and double glazing will assist with regulating internal conditions.
- **Building energy improvement** - Energy modelling will be undertaken using the National Construction Code (NCC) Section-J, JV3 energy modelling guidelines. The energy modelling will demonstrate the project achieves a minimum 10% energy reduction against the benchmark standard.

Mechanical Services

The following mechanical services initiatives have been considered for the Nepean Hospital Stage 1 Tower.

- **Energy efficient FCU's** with Electronically Commutated (EC)/ Direct Current (DC) motors to provide air-conditioning to necessary spaces;
- Where appropriate, **pre-tempering of outdoor air** with relief using air to air heat exchangers;
- The use of **efficient refrigerants** that have low ozone depletion potential and low global warming potential;
- **Maximise efficiency** of full and part load performance of Heating Ventilation and Air Condition (HVAC) systems;
- **Incorporate passive conditioning** techniques where applicable to reduce the overall air conditioning loads. Techniques to be considered include:
 - o Shading of windows to prevent solar penetration in summer but allow passive heating in winter;
 - o Building thermal mass and insulation combinations;
 - o High performance building envelope.
 - o Building Management System (BMS) to schedule and optimise plant efficiency;
 - o The air-conditioning system to be designed to either shut down or be set to a wider temperature control band, when a space is unoccupied;
 - o Preference to be given to energy efficient equipment, with consideration of cost, suitability and maintenance;
 - o Control of outside air via a time clock, occupancy sensors, and CO2 sensors, to minimise outside air conditioning requirements when spaces are not fully utilised;
 - o Dedicated secondary Chilled Water (CHW) and Heating Water (HW) circuits to ensure the campus has future means to interrogate and apportion building energy use
 - o Energy and infrastructure service metering to be incorporated to monitor buildings electrical, water and gas usage

Lighting Design

The following lighting design initiatives are being considered for the Stage 1 Building.

- **Light-emitting Diode (LED)** low wattage high efficiency luminaire to be considered across the project for long life span of luminaire;
- **Photoelectric (PE) cell and timer** controlled luminaires for exterior environments;
- **Luminaire to be grouped and dimmed** in relation to the function and use of the space;
- **Occupancy sensor** controlled luminaires in general non-patient care type areas – staff amenities, Back of House (BOH) corridors;
- **Zoning** - Apply business hours on off functionality for overall lighting control zones. Zoning for areas that require lighting outside of this time frame; and
- **Operable fenestrations systems** to be programmed in conjunction with intelligent lighting control and Photoelectric (PE) cell to modulate light levels to accommodate various environmental conditions.

2.2 Water Conservation

Water efficiency is another key aspect of sustainable design. For the proposed Stage 1 Building, the major uses of water would include:

- **Low flow water efficient fixtures / fittings** - will be specified where possible and in accordance with Australasian Health Facility Guidelines (AusHFG).

Rainwater collection and reuse systems have not been considered for redevelopment due to the clinical environments and the prevention of infection being a priority. The storage of collected rainwater may contain or breed legionella, deceased animals, mosquitoes, chemicals, microbial hazards and Escherichia coli.

2.3 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design (WSUD) integrates water cycle management with urban planning and design. The aim of WSUD is to manage the impacts of storm water run-off from the development to protect and improve waterway health by replicating the natural water cycle.

As part of the WSUD, the development will incorporate WSUD elements to ensure that the water quality targets are met. The strategies being considered include:

- **Bio-retention, grass swales and proprietary devices** (cartridges, pits inserts and gross pollutant traps) as required to meet the pollutant reduction targets; and

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- **Minimise impervious surfaces**, and where possible will allow runoff from impervious surfaces to pass onto pervious surfaces to allow opportunity for infiltration.

It is important to note that the above strategies are being considered, and will be finalised once road, landscape and building layouts are confirmed.