If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

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Lighting Design
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SUSTAINABLE DESIGN

STEENSEN VARMING

The Sutherland Hospital Operating Theatre Upgrade Project (TSHOTUP) ESD SEARS Report

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1.0 Introduction

1.1 Overview

This ESD assessment has been prepared as part of the State Significant Development application for the Sutherland Hospital Operating Theatre Upgrade Project (TSHOTUP). Specifically this report has been prepared to address item 7 Ecological Sustainable Design (ESD) for the SEARs issued for the project which states

- Detail:
  - how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) would be incorporated in the design and ongoing operation phases of the development
  - proposed measures to minimise consumption of resources, water (including water sensitive urban design) and energy
  - how the future development would be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.

- Include:
  - an assessment against an accredited ESD rating system or an equivalent program of ESD performance. This should include a minimum rating scheme target level
  - a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change
  - an Integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design.

Relevant Policies and Guidelines:

- NSW and ACT Government Regional Climate Modelling (NARCliM) climate change projections.

The scope of the proposed works the subject of this SSD application includes the following:

- Alterations and additions to the existing South Wing building west towards the Ambulance Station, including:
  - Additional operating theatres;
  - Additional endoscopy suites;
  - New Magnetic Resonance Imaging (MRI) space;
  - New Central Sterilising Services Department (CSSD);
  - Surgical short stay unit;

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- Post- Anaesthesia Care Unit (PACU), recovery and other perioperative clinical and
- supporting spaces;
- Facilities for admission and discharge;
- Refurbishment of Level 3;
- Associated Staff Amenities.
- Earthworks and demolition;
- Tree removal and landscaping works.

1.2 Response to SEARS

The ESD SEAR's report is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD-11099584. This table identifies the SEARs and relevant reference within this report.

Ecologically Sustainable Development (ESD) **Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) will be incorporated in the design and ongoing operation phases of the development.**	
SEARs Items	**Project Response to DGR**
Detail proposed measures to minimise consumption of resources, water (including water sensitive urban design) and energy.	The ESD initiatives proposed for the Sutherland Hospital Operating Theatre Upgrade Project (TSHOTUP) aims to reduce the environmental impacts typically associated with buildings during the construction and ongoing operation of the building. The project utilises a resource hierarchy approach, with emphasis on avoiding then reduction of energy, water, materials etc. The outcome of the resource hierarchy approach is to ensure the hospital 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 3.0 Resource Conservation for the proposed ESD initiatives.
Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.	TSHOTUP is targeting an equivalent/self-certified 4 Star Green Star rating utilising the Green Building Council of Australia's (GBCA) Design and As-built rating tool (DAB) version 1.3. A 4 Star Green Star rating is considered 'Best Practices' level. ESD strategies have been proposed in improving the environmental performance of the building, such as improved indoor environment quality, energy and water conservation, renewable energy, waste reduction, management processes, ecology and landscaping and water sensitive urban design. The measures proposed are included in Section 3.1 onwards. The measures will be benchmarked against the performance requirements of the equivalent/self-certified rating.
Include an assessment against an accredited ESD rating system or an equivalent program of ESD performance. This should include a minimum rating scheme target level	TSHOTUP is targeting an equivalent/self-certified 4 Star Green Star rating utilising the Green Building Council of Australia's (GBCA) Design and As-built rating tool (DAB) version 1.3. A 4 Star Green Star rating is considered 'Best Practices' level.

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Ecologically Sustainable Development (ESD) **Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) will be incorporated in the design and ongoing operation phases of the development.**	
SEARs Items	**Project Response to DGR**
	The self-certification pathway is based on the agreed approach between Health Infrastructure and DPIE in demonstrating an equivalency against the Green Star rating system. The Green Star rating tool is a framework developed by the GBCA, and is categorised in 9 sustainability categories which cover issues such as environmental management, indoor environment quality, energy, water, waste, transport, emissions, ecology and innovation. Refer to section 2.1 HI ESD Evaluation Tool
Include a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change.	A climate adaptation study has been undertaken to identify the climate risks in response to the projected impacts. Actions and design strategies have been identified to lower the impacts and the associated risk levels. At the current stage, the Sutherland Hospital Operating Theatre Upgrade Project (TSHOTUP) proposes the following strategies in response to the CSIRO projected impacts of climate change. **Hotter days and more frequent heatwave events:** ■ Passive building design features to reduce/dampen the effects of increasing temperature, the window to wall ratio has been optimised and the solar gain will be controlled with shading ■ TSHOTUP proposes the use of air conditioning. This is to ensure that appropriate internal conditions can be achieved and maintained as temperatures continue to rise. ■ Light colour finishes will be used for the roof and a sheltered landscaping area has also been proposed to reduce urban heat island effect, whilst offering an outdoor area of respite and healing environment. ■ Larger Air Handling Units have been proposed for additional capacity in the event of increased temperatures. ■ Electrical infrastructure has additional capacity, and a backup generator will provide ongoing power supply in the event increased temperatures result in a blackout/brown out. **Extended drought periods:** ■ Consideration of native low water landscaping to reduce potable water consumption. ■ The building energy performance and façade design will be optimised to reduce cooling loads, and the cooling tower water use. **More extreme rainfall events:** ■ No increase in permeable area; ■ Consideration of increased drainage capacities to reduce flooding of roofs and hard surfaces; and ■ Assessment of design of the building to address post development probable maximum flood (PMF) level.

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Ecologically Sustainable Development (ESD) **Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) will be incorporated in the design and ongoing operation phases of the development.**	
SEARs Items	**Project Response to DGR**
	Gustier wind conditions: ■ No trees close to windows, thus minimising the potential impact of falling trees and damage to the building; ■ Young trees close to the ambulance entry; ■ In-ground infrastructure will reduce wind impacts. **Material selection:** ■ Use of durable façade materials and materials to improve building thermal performance such as insulation and thermal mass; and ■ Covered/shaded outdoor respite areas. ■ Selection of materials with lower embodied carbon impact, and responsibly sourced.
Include an Integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design.	An Integrated Water Management Plan will be developed by the design team. Refer to the Civil design report for measures related to stormwater drainage (run-off and pollution) and flooding. Refer to Section 3.4 Emissions for details regarding water sensitive urban design.

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2.0 Requirements and targets

NSW Health Infrastructure (HI) has defined high-level targets for the Sutherland Hospital Operating Theatre Upgrade Project (TSHOTUP) as follows:

- Within 6 months of commencement of operation, HI ESD Evaluating tool certification must be obtained demonstrating the development achieves a minimum 45/110 points to the requirements outlined in this Memorandum;
- A minimum improvement to the baseline of NCC Section J Part J1 R-values by 5% for compliance applicable to the development.

2.1 HI ESD Evaluation Tool

HI ESD evaluation tool is a list of sustainable initiative categorised in 9 sustainability sections which cover issues such as management, indoor environment quality, energy, water, waste, transport, emissions, ecology and innovation.

TSHOTUP is targeting a self-certified approach to achieve 'Australian best practice' level, which is equivalent to 45 points / 110 available.

The self-certification pathway is based on the agreed approach between Health Infrastructure and Department of Planning, Industry and Environment (DPIE) in demonstrating an equivalency against the Green Star rating system.

In addition to the above high-level targets, NSW Health Infrastructure has defined minimum targets for individual point categories, and these are outlined in the HI ESD Evaluation tool.

2.2 NCC Section-J

Section-J of the National Construction Code (NCC) 2019 (Previously known as the Building Code of Australia (BCA)) outlines the minimum energy efficiency provisions for buildings, known as deemed-to-satisfy (DTS) requirements. Section J applies to the building fabric thermal performance and building services efficiency. The NCC 2019 Section J was enforced on the 1st of May 2019 and applicable to this project. This updated version is significantly more stringent than the NCC 2016 Section J. Some key updates include:

- **J1 – Building Fabric:** Higher performance building fabric required (Insulation / Glazing / Lower window to wall ratio required);
- **J5 – Air Conditioning & Ventilation Systems:** Stricter requirements for system control / fan / pump / insulation / efficiency;
- **J6 – Artificial lighting & power:** Lower Lighting Power Density requirements / Commitment to LED lighting / Greater lighting control requirements and coverage / Criteria for lift energy, escalator & moving walkway control.

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While it is mandatory to comply with the Deemed-to-Satisfy (DTS) requirements of Section-J, it is expected that the proposed TSHOTUP project aim to exceed these requirements to demonstrate leadership in sustainable design. The specific strategies to achieve this are reviewed in more detail and form part of other documents. A climate adaptation plan is also assess the impact of predicted average temperature increases due to climate change.

Any improvement in energy-efficiency beyond the minimum requirements of Section-J, will also contribute towards the project's HI ESD Evaluation Tool energy score.

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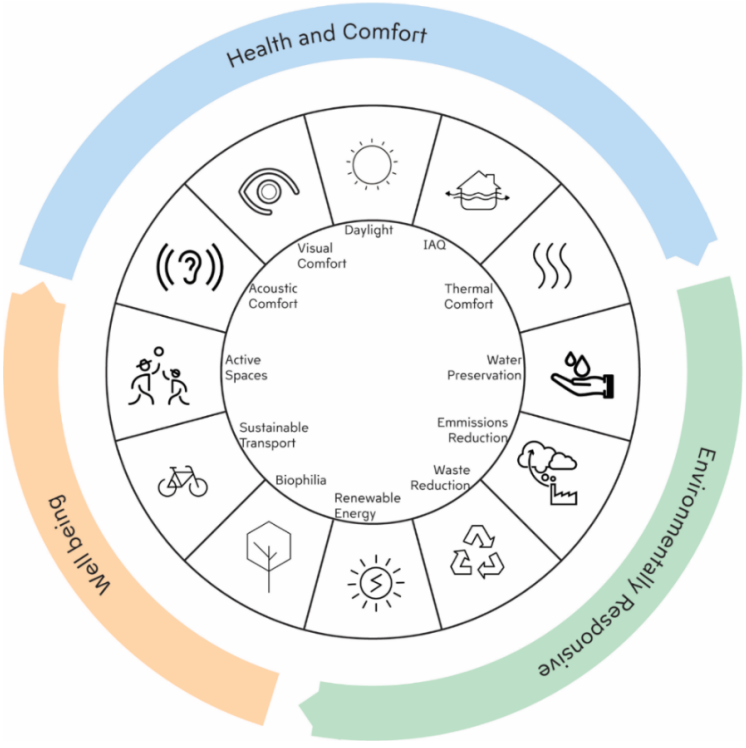
3.0 Sustainability Approach

Sustainable building design involves a holistic and integrated design approach, which builds on an increased awareness of site opportunities, form, and function, to encompass and target a broad range of sustainable design initiatives.

For the Sutherland Hospital Operating Theatre Upgrade Project (TSHOTUP), the key priorities to support the functional demand i.e. surgery, patient recovery, resource efficiency, are as follows:

- Support the hospital masterplan extension strategy.
- Creation of healing environments.
- Targeting improved indoor environment for staff, patient, and visitor's, including:
  - The promotion of natural daylight and views;
  - High levels of IAQ (Indoor Air Quality);
  - Thermal, Visual and Acoustic comfort; and
- Resource conservation (energy and water) and waste reduction.

Creation of Healing Environments – Healing environments are a critical component for healthcare and hospital facilities. Healing environments with good natural daylight and thermal comfort have shown to increase patient recovery times, which is key attribute of a sustainable hospital.



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Creation of high-quality space supporting occupant's wellbeing - the operating theatre upgrade will accommodate hospital staff and patients. The patients will be asleep for most of their stay in the area. The project aims to provide high quality space for its users by incorporating the following elements:

- **The promotion of natural daylight** – There is a direct correlation between access to daylight and patient recovery times, staff attention, productivity, and general wellbeing. In design for natural daylight, consideration must be given to daylight uniformity, penetration depth, solar heat ingress and glare control;

- **Indoor Air Quality (IAQ)** – In a similar manner to daylight, there is a correlation between occupant wellbeing, patient recovery time and staff retention. Principle strategies include:
    - Effective strategies in ventilation, filtration, and pollution control;
    - Low pollutant emitting materials selections such as low VOC paints, adhesives, sealants, composite woods etc.

- **Excellent Thermal and Acoustic comfort:**
    - Thermal comfort: Patients, staff and occupants are not subject to unacceptable extremes in temperatures as they recover and work;
    - Acoustic comfort: To ensure noise from ventilation systems is eliminated, external and internal disruptive noise affecting spaces and to maintain privacy.

The health and wellbeing strategy will be further developed as the design progresses.

Resource conservation (energy, water) and waste reduction – In delivering on the functional demands of a hospital, incurs resource use through the optimisation of these attributes. These are to be supported with minimal consumption of energy and water resources, or the generation of waste and pollution in demolition, construction, and operation of the building. Our approach to resource conservation is based on applying a "hierarchy" methodology as outlined in the following sections.

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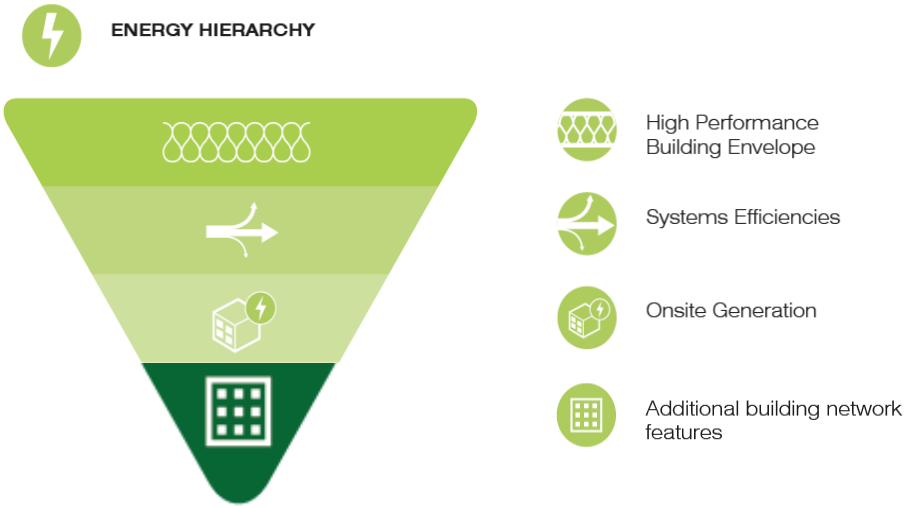
3.1 Energy Conservation

The proposed approach to sustainability and energy related systems is based on applying an "energy hierarchy" methodology.

This methodology has the reduction of energy use as its first priority, and then seeks to meet the remaining energy demand by the most efficient means available, before the inclusion of on-site generation and importation of green power.



The following energy initiatives have been proposed for TSHOTUP:

- **Building Form** has been designed with consideration of façade access for greater access to natural daylight and opportunity. The operating theatres are located to the South while the administrative and staff areas are location in the North, with greater access to daylight and views.
- **WWR and solar gain control.** There is limited glazing the South façade for the theatre area, and no glazing on the West to facilitate the future extension. The North facade will have higher level of glazing that will be protected from solar gain with external shading devices.
- **Façade performance**. A new façade will be installed on the extension, there are therefore opportunities to optimise the Solar Heat Gain Coefficient (SHGC), light transmittance (VLT) and U-values.
- **Building energy performance improvement** - A minimum improvement to the baseline of NCC Section J Part J1 R-values by 5% .
- **High efficiency HVAC** which includes chillers, boilers, fans, pumps, and heat rejection.

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- **Energy efficient LED lighting**, zoning, controls, and site co-ordination for both internal lighting systems are to be designed.
- **CO2 monitoring** will be considered.
- **Metering and Monitoring** will be included in the design to monitor energy consumption for ongoing building reporting and tuning.

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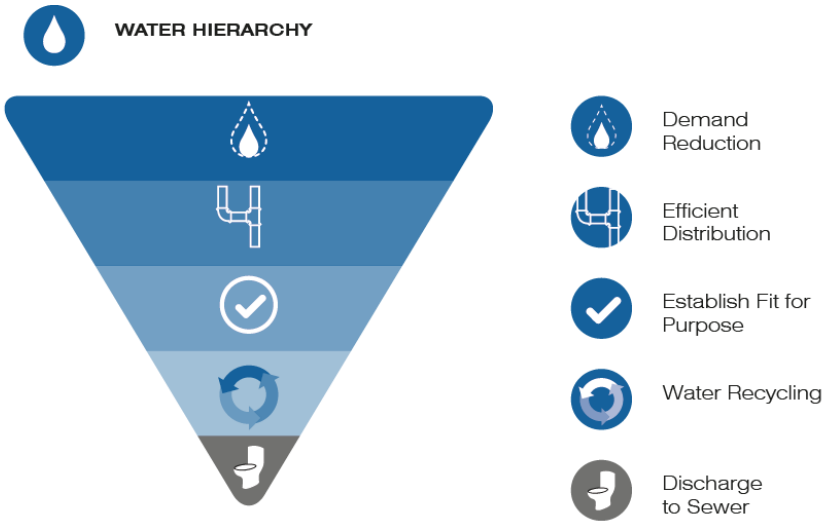
3.2 Water Conservation

The following hierarchy will be applied, along with the following proposed strategies:



- **Water efficient fixtures** / fittings will be specified. These include fittings such as taps, showerheads, toilets, zip taps, dishwashers etc certified under the WEL rating scheme;
- **Cooling tower** water reduction measures have been considered;
- There is a sheltered **landscape area** on the site, the endemic and native planting will be selected so that reduced irrigation will be required. The landscape area is located on the stormwater run-off natural flow and will benefit from passive irrigation.
- **Recycled Water / Rainwater Harvesting and Reuse** – there are limited opportunities for water recycling, it is not recommended for toilet flushing in healthcare facilities. Recycled water could be reused for the landscape area, however, due to its small size it is **not considered viable**.

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3.3 Materials

Selection of environmentally preferable materials is a key priority for the project because building materials consume energy and natural resources during its manufacture and for their transportation to the construction site.

Preference will be given to materials that contain high-recycled content and/or are highly recyclable. The following strategies have been proposed:

- **Recycled cement** – The project aims to reduce the use of Portland cement through substitutions. Fine and coarse aggregate inputs are to be sourced from manufactured sand or other alternative materials, and the amount of Portland cement will be reduced within the concrete mix.
- **Steel** – will be specified to meet specific strength grades, energy-reducing manufacturing technologies, and off-site fabrication. Steel will also be sourced with a proportion of the fabricated structural steelwork via a steel contractor accredited by the Environmental Sustainability Charter of the Australian Steel Institute.
- **Responsibly sourced timber**- timber products used for concrete formwork, structure, wall linings, flooring and joinery will be sourced where possible from reused, post-consumer recycled or FSC-certified, or PEFC certified timber.
- **High recycled content or recyclability** – Furniture items with high recycled or recyclability content have been considered.
- **A Life cycle assessment** will be undertaken to measure the project embodied carbon and identify measures to reduce embodied carbon emissions.

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3.4 Emissions

Proposed design aims reducing of all forms of emissions, including watercourse pollution, light pollution, and ozone depletion.

- **Stormwater management** – An On-Site Stormwater Detention Tank has been proposed as part of the Infrastructure Upgrade Works, that are currently underway in 2021. These works are separate to this the scope of this SSDA.

- **Light pollution** will be minimised, the external lighting will mostly be used for security and avoid up-lighting.

3.5 Other Key measures

Additional measures have been considered for TSHOTUP, they aim to reduce the environmental impacts associated with the construction of new buildings.

- **Environmental Management Plan (EMP**) – The EMP will be developed and implemented for the construction stage, including demolition and excavation, to address environmental, worker health and safety and community risks. The EMP is a project specific plan and developed using State and Federal Guidelines and standards. The main contractor will implement an Environmental Management System certified to the ISO 14001 standard to ensure the objectives of the EMP are met.

- **Site waste management plan.** During the demolition and construction phase, a project-specific site waste management plan (WMP) will be developed and implemented, to reduce recycling of demolition and construction waste.

- **Comprehensive commissioning** – pre-commissioning, commissioning, and quality monitoring for all building services will be carried out.