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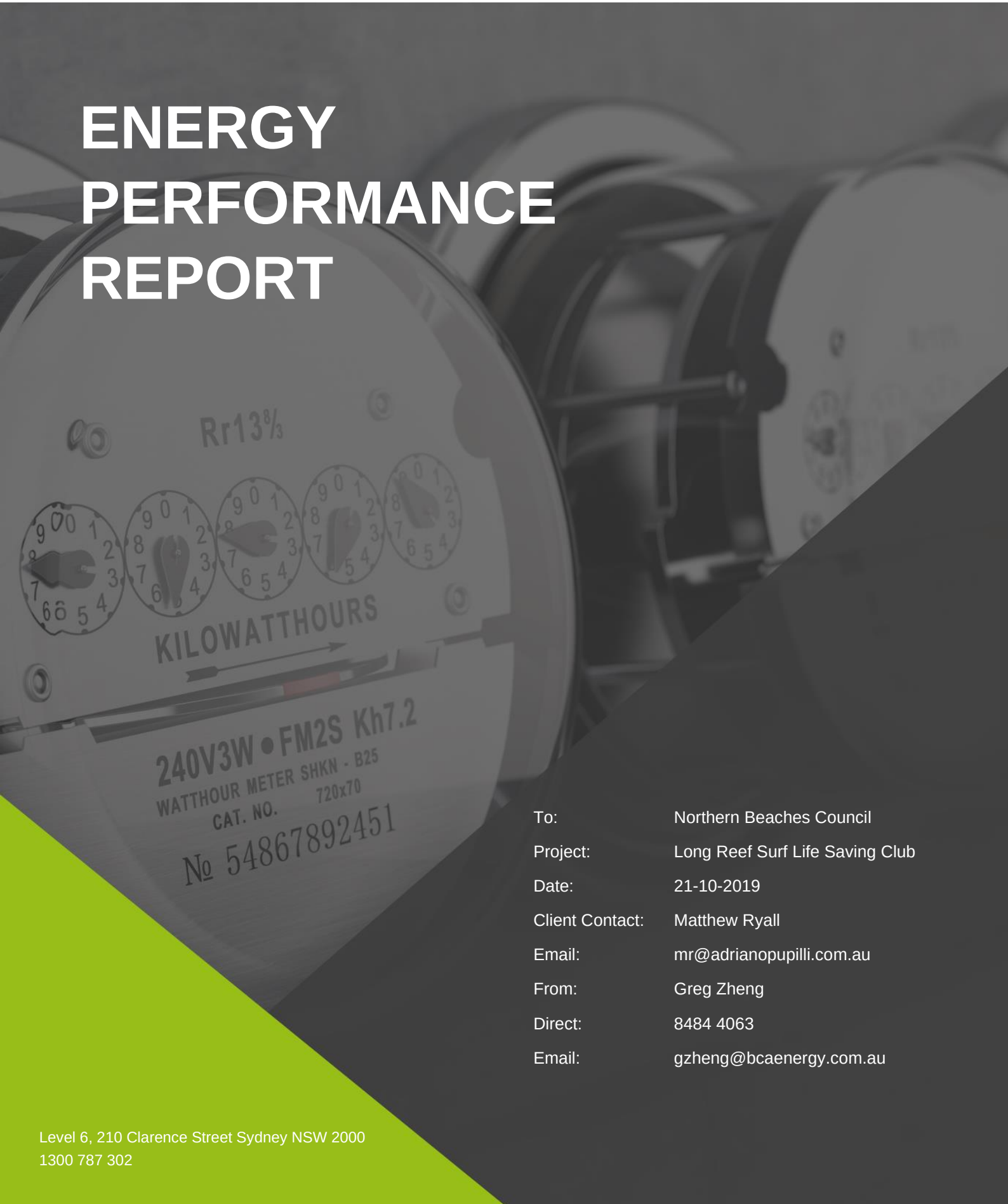
Sustainable Design Consultants

ENERGY PERFORMANCE REPORT



To:	Northern Beaches Council
Project:	Long Reef Surf Life Saving Club
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DOCUMENT CONTROL

Latest Revision	Issue Date	Report Details		
1822-EPR-r1/gz	21-10-2019	NCC Section J Assessment Report		
Note: DA Design Energy Performance Assessment		Prepared by	Checked by	Approved by
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Previous Revisions	Issue Date	Revision Notes

Table of Contents

1 PROJECT INTRODUCTION

1.1 Location and Description

The building development, the subject of this report, is located at Long Reef Surf Life Saving Club (SLSC), Collaroy NSW 2097 and consists of existing building renewal with approximately 980m^2 gross floor area, include surf life saving facilities, café, training room, gym, amenities and a community function room.

1.2 Purpose

The purpose of this report is to assess the project's proposed design against the environmentally sustainable design and energy efficiency components in line with Northern Beaches Council planning standard. This report addresses:

- Sustainability drivers stipulated from relevant regulatory and project requirements
- Project's design responses corresponding to the sustainability drivers

1.3 Regulatory Compliance

This report has been prepared in direct response to the relevant sections under:

- Section 3.5, Manly Development Control Plan (DCP) – 2013
- *Energy reduction category*, Part D22, Warringah Development Control Plan (DCP) – 2011

With high degree of similarities between the regulatory criteria stipulated under DCP frameworks and Energy Efficiency provisions under the improved NCC2019 Section J, the report has been prepared in form of Section J compliance design to address specified DCP criteria; and where parts of the Section J provision are inadequate, additional sustainability design requirements are introduced to achieve DCP compliance.

1.4 Design Documentation

This report has been based on the DA Design plans and Specifications provided by *Adriano Pupilli Architects*.

1.5 Project Classification & Location

The project is located within Climate Zone No.5, and has been classified as follows:

Class	Level	Description
6	G	Café
9b	G & 1	Training, gym, function room & amenities
7b	G	SLSC storage & locker

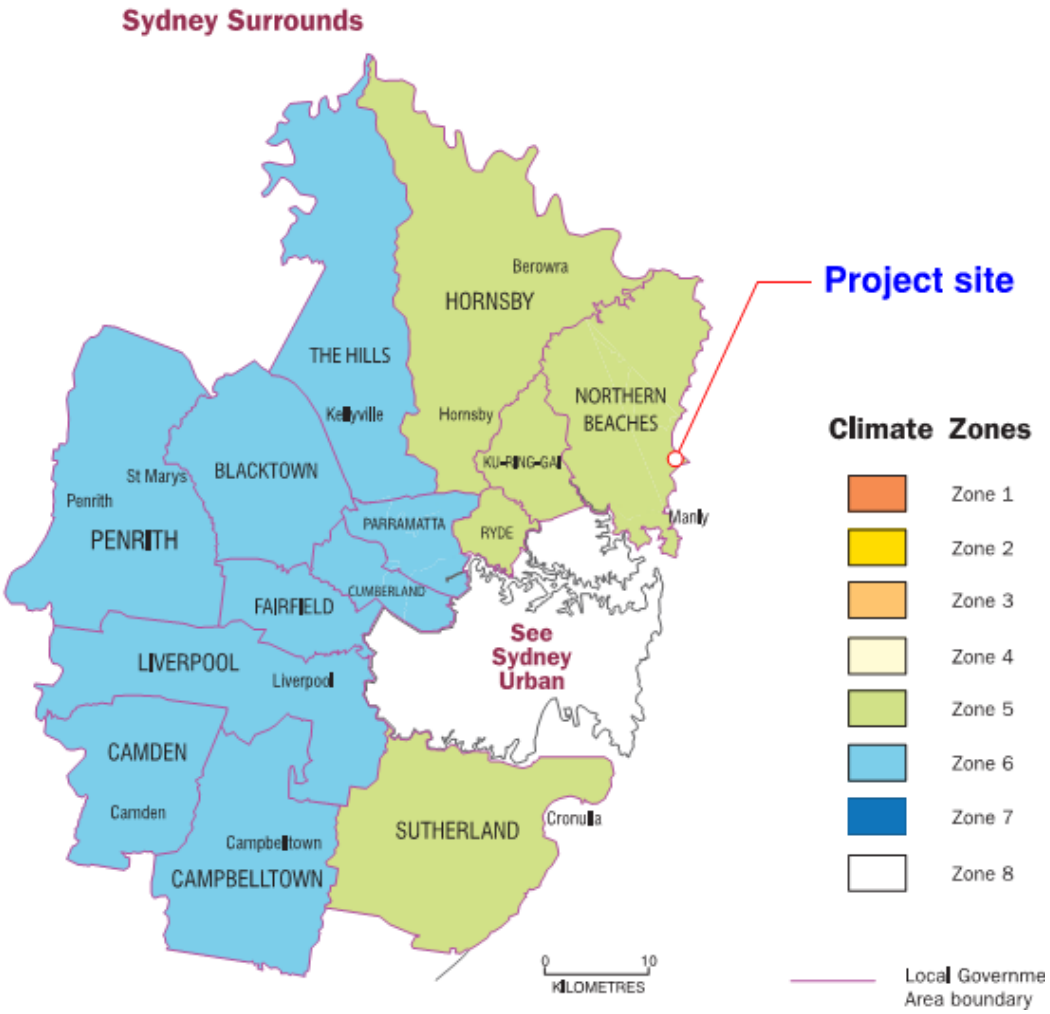


Figure 1 https://www.abcb.gov.au/Resources/Tools-Calculators/Climate-Zone-Map-NSW-and-ACT

2 PROJECT GREENHOUSE ENERGY EFFICIENCY REQUIREMENT

The following regulatory frameworks apply to the project:

2.1 Part D22, Warringah Development Control Plan (2011)

2.1.1 D22 Conservation of Energy and Water

- *Objective – To encourage innovative design solutions to improve the urban environment.*
- *Objective – To ensure energy and water use is minimised.*
- *Requirements:*
    - *The orientation, layout and landscaping of sites is to make the best use of natural ventilation, daylight and solar energy*
    - *Site layout and structures are to allow for reasonable solar access for the purposes of water heating and electricity generation and maintain reasonable solar access to adjoining properties.*
    - *Buildings are to be designed to minimize energy and water consumption.*
    - *Landscape design is to assist in the conservation of energy and water.*
    - *Reuse of stormwater for on-site irrigation and domestic use is to be encouraged, subject to consideration of public health risks.*
    - *All development must comply with Council's Water Management Policy.*

Our interpretation of the Warringah DCP objectives is to ensure the project development incorporates passive design strategy and reuse of resources to achieve energy and water consumption reduction. Note the criteria set out within Warringah DCP framework does not provide tangible targets, and absence of operational related energy saving requirements, as such the energy reduction framework under the Warringah DCP shall refer to the newer revision *Manly DCP paragraph 3.5* for a more comprehensive and stringent design guidance. For the purpose of this Energy Performance Report, the requirements of Manly DCP supersede the requirements of Warringah DCP.

For water reduction requirements, refer to Manly DCP's *DA statement of Environmental Effects* which covers specific design criteria on Water Sensitive Urban Design.

2.2 Manly Development Control Plan (2013) – Sustainability

2.2.1 DCP Paragraph 3.5.6 - Energy efficiency/conservation requirements for non-residential developments

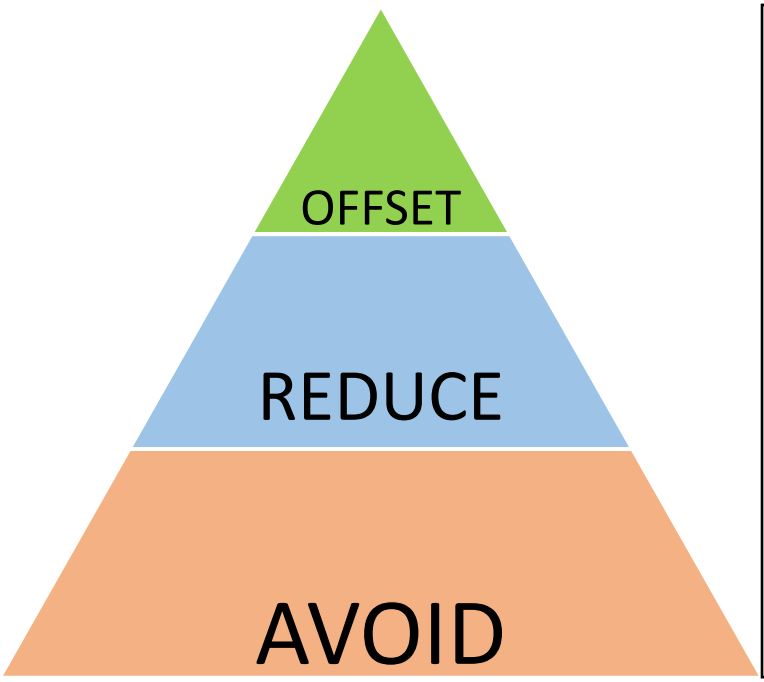
Non-residential development must comply with the energy efficiency requirements prescribed in Figure 17 - Energy Efficiency / Conservation Requirements.

Development type	What must be complied with
New business premises, retail premises, office premises and industrial buildings involving a gross floor area of greater than 500sqm.	*The total anticipated annual energy consumption and greenhouse gas emission production must be in line with current best practice to be determined in the Energy Performance Report. This Report must outline how these targets will be achieved under objectives 6 and 9 at paragraph 3.5 of this plan. See also Council's Administrative Guidelines* *The Energy Performance Report will investigate and evaluate the use of the least greenhouse gas intensive form of energy such as trigeneration and solar farm technology.* *New or replacement hot water systems of domestic/ residential scale must be solar hot water in accordance with paragraph 3.5.2.* *Energy star rated electrical appliances must be supplied in accordance with paragraph 3.5.4.* *See also paragraph 3.4.1.3 Overshadowing Solar Systems.*

2.2.2 DCP Paragraph 3.5 - Sustainability

- *Objective 6) – To encourage energy efficient building design, construction and practices, that reduce energy consumption (primarily for heating and cooling), reduce the use of non-renewable fossil fuels, minimise air pollution, greenhouse gas emissions and reduce energy bills.*
- *Objective 9) – To site and design development to optimise energy conservation (in accordance with the energy hierarchy) and sustainability to which BASIX does not apply.*

Our interpretation of the Manly DCP objectives is to ensure project's energy consumption or greenhouse emission reduction are achieved through means of AVOID, REDUCE and OFFSET design hierarchy action; which means, the foremost effective strategy is to minimise energy demand through building elements, followed by improving the efficiency of building systems and finally substituting grid energy with alternative sources.



OFFSET – Provide alternative energy sources. i.e. onsite generation, renewable systems, waste heat reclaim or green power purchases

REDUCE – Operation energy with improved efficiency requirement to building operational systems, i.e. mechanical and electrical equipment

AVOID – Prevent unnecessary energy through passive design and user behaviour. i.e. building orientation, solar access, natural cooling, glazing/fabric requirement and improve occupant awareness to building feature uses

2.2.3 DCP Paragraph 3.5.2 - Energy Sources and Systems

- *Photovoltaic solar cells - Electricity from solar power is an environmentally friendly alternative to electricity produced by other sources, such as coal, that produce greenhouse gases.*
- *Solar Hot Water Systems - A solar hot water system with electric or gas boosters to provide the rest of hot water needs and produce no greenhouse gas emissions.*
- *Trigeneration and Cogeneration - use of the waste heat to provide electricity, useful heat and cooling where applicable, avoid power transmission losses and maximise wasted heat usage.*
- *Other energy reduction considerations include:*
    - *Ceiling fan can be used in summer or winter;*
    - *Passive design methods with window shading, insulation, infiltration prevention, or natural cooling;*
    - *For cooling system design, consideration needs to be given to the room size, location, indoor health, system arrangement and environmental impact on adjacent buildings*

Paragraph 3.5.2 outlines specific energy/emission reduction strategies through AVOID & OFFSET hierarchy design options. The relevancy of the listed options to be selected and assessed in reference to the suitability of the project in section 3 of this report.

2.2.4 DCP Paragraph 3.5.4 - Energy Efficient Appliances and Demand Reduction and Efficient Lighting (non-residential buildings)

- *New and replacement installed electrical appliance must be rated no less than one star below the maximum available for that appliance type on the Energy Star rating schemes at the time of installation*
- *New or replacement air conditioning units are to have a minimum 4 star energy rating for cooling only. Reverse cycle air conditioning units are to have a minimum of 4 star rating on one cycle and 3 star rating on the alternate cycle*
- *New gas heaters must be rated no less than one star energy rating below the maximum available at the time of installation*
- *Demand reduction lighting technologies and energy efficient lighting must be used including:*
    - *High energy efficient lamps including LED lights, compact fluorescent lights or tubular quad phosphor and troposphere fluorescent lamps with high frequency ballasts*
    - *Appropriate lighting lux levels relative to the use of different areas*
    - *Fitting controls to ensure lights are not left on when not required, including automated lighting controls, movement sensors, timers, lux level sensors and voltage reduction units*
    - *Providing energy efficient lighting such as solar, metal halide or sodium discharge lamps for the security of external spaces, such as car parks and controlling external lighting by time and movement sensors.*

Paragraph 3.5.4 outlines specific energy/emission reduction strategies through REDUCE hierarchy design option improve operational equipment efficiency requirement. The relevancy of the listed options to be selected and assessed in reference to the suitability of the project in section 3 of this report.

2.2.5 DCP Paragraph 3.4.1.3 - Overshadowing Solar Collector Systems

A minimum of 6 hours solar access be retained to solar collectors on neighbouring properties.

Access shadowing impact to adjacent buildings where applicable

2.3 NCC2019 Section J – Energy Efficiency

The primary objective of Section J provisions is designed to reduce greenhouse gas emissions through improved performance of building fabric elements and operational services systems in the following categories. Minimum Deemed-to-Satisfy (DTS) design requirements to be followed for the project:

- J1-Building Fabric
- J3-Building Sealing
- J5-Air-conditioning & ventilation systems
- J6-Artificial lighting & power
- J7-Heated water supply and swimming pool and span pool plant
- J8-Facilities for energy monitoring

2.4 Manly DCP vs. NCC2019 Section J Provisions

The following table compares Manly DCP criteria and proposed strategies to achieve DCP compliance.

Manly DCP Criteria	Standard Section-J DTS Provisions	Additional Requirement
Paragraph 3.5 - Objectives to minimise energy needs & environmental impact through hierarchy actions: **- *AVOID*** **- *REDUCE*** **- *OFFSET***	J1 - Improve building fabrics to *AVOID* energy needs J3 - Improve building sealing to *AVOID* energy needs J5 - Improve mechanical system efficiency to *REDUCE* energy demands J6 - Increase electrical system requirement to *REDUCE* energy demands J7 - Increase water system requirement to *REDUCE* energy demands J8 - Increase monitoring system requirement to *REDUCE* energy consumption	Nominate suitable alternative energy source to *OFFSET* project's energy consumption
Paragraph 3.5.2- Strategies to AVOID & OFFSET energy consumption: **-PV solar cells** **-Solar hot water** **-Waste heat reclamation** **-Passive strategy** **-Environmental impact**	Passive strategy - J1 prescribes building fabric element & passive design requirements Mechanical system design - J5 prescribes mechanical design standard to assess relevant systems in accordance to operational noise and microbial control requirement Electrical design – J6 to lighting requirement to promote provision of higher quality light fitting	Assess suitability of the nominated alternative systems to the project: -PV Solar cells -Solar hot water -Waste heat reclamation
Paragraph 3.5.4 -Strategies to REDUCE operational energy: **-Lighting & Electrical systems** **-Electrical Appliances** **-Mechanical systems** **-Gas heaters**	Lighting & Electrical - J6 prescribes lighting, water system and transportation system control requirements Mechanical systems - J5 prescribes mechanical system efficiency and control requirements Gas heater - J7 prescribes heated hot water system efficiency and control requirements	-Electrical appliance to be rated no less than one star below the maximum at the time of installation

3 SUSTAINABILITY DESIGN STRATEGIES

With the intent to satisfy the DCP sustainability criteria, and minimise the environmental impact of this renewal project, the following preliminary ESD design strategies are proposed in direct response to the DCP clauses as listed in section-2 of this report:

3.1 Solar Access & Passive Ventilation

In accordance with paragraph-3.5 Objective 6), *reduce the use of non-renewable fuel*, the building is orientated north facing with external shading devices, which allows greater natural light exposure during the day and resulting direct reduction in artificial lighting load.

The project's solar access is designed to ensure optimum passive thermal control for year-round comfort. Floor-to-ceiling height glazing to main function and training rooms ensure high level of natural light is captured. For trafficable balcony locations, the designated horizontal shadings and roof awning ensure effective solar control to the occupant's spaces in accordance to season demand, mitigate peak summer cooling load requirement. Other passive design features which include:

- Inclusion of large north facing concrete floor to absorb solar heat and provide passive heating in winter months
- Operable stack-doors to enhance cross ventilation when external condition is favourable (eastern prevailing wind in summer), reducing cooling load requirement

Relevant Manly DCP Criteria	Relevant Section-J DTS Provisions	Additional Project Specific Requirements
1-Paragraph 3.5.2: AVOID energy needs via building *fabric* design	J1 – Provision of *glazing* & *shading* requirement to minimise active cooling, heating, ventilation and lighting needs	○ North facing building orientation, optimise natural daylight and passive heating opportunities ○ Provision large glazing area to north façade with shading, improve natural daylight and reduce artificial lighting ○ Provision of thermal mass (concrete floor) to promote passive solar heating and reduce mechanical heating load ○ Provision of operable openings to promote internal cross ventilation and reduce mechanical loads ○ Provision of ceiling height louvres in the function hall which interconnected to the foyer below, promote stack effect and boost cross ventilation ○ Provision of open-air roof lights to non-conditioned amenities block, promote natural ventilation and daylighting

3.2 Energy & Greenhouse Gas Emission Reduction

To address the key objective of DCP sustainability requirements, which primarily focus on energy and greenhouse gas emission reduction, the summary below outlines the energy efficiency measures proposed for the development:

- Entire project design to comply with current NCC2019 section-J DTS provisions
- Minimum Low-E or better glazing system to reduce heat losses & solar gains
- Provision of green roof to locker and amenities blocks to reduce internal heat load and lower ventilation demand
- Energy efficient artificial lighting with LED specification throughout, and provision of control devices to ensure light power is cut or reduced when not required
- Install HVAC systems with min. 4 star energy star rating or better; for non-packaged systems, Variable Speed Drive (VSD) to be provided. Install control system to deactivate HVAC operation when space/zone is not occupied
- Ceiling fans to be incorporated for training room & café. Ceiling fan is not recommended for the function room as stack effect may be interrupted where the direction of ceiling fan air flow opposes the heated air rise through the ceiling louvre.
- Optimise control system for the operation of bifold/stack doors and louvre windows for natural ventilation
- Photovoltaic (PV) solar panels – With the absence of any neighbouring building, and proposed north facing roof, PV panels would provide great benefit from uninterrupted power generation at the optimum orientation. Additionally, the building operational profile follows the peak solar output profile, making it an ideal renewable candidate for the onsite generated power without the need for additional power storage or power grid export requirement. 5KWp PV system has been proposed on north-facing rooftop, to offset portion of the energy demand during daytime operation, including artificial light, cooling & heating, and ventilation needs
- Waste Heat Reclamation – Trigeneration and Cogeneration systems offer great environmental benefits by turning waste heat into useable energy source for heating and cooling needs. However, such systems still rely on continuous burning of GHG emission sources, and more suited project sites with consistent demand for heating, cooling and power, such as data centre or industrial centre process loads. Additional financial considerations such as high capital cost and ongoing specialist maintenance requirement, it is therefore not a viable for the size, and operational nature of this project
- All doors, windows, exhaust fans and openings to be sealed as per NCC provision
- Energy efficient electrical appliances within 1 star of best available at time of tender
- Energy efficient gas heater within 1 star of best available at time of tender
- Solar hot water system – For solar hot water system to be feasible with the account for higher capital cost and additional storage tank requirement, the demand for domestic hot water shall be considered the daily usage of both amenities showers and kitchen taps; where solar hot water system is deemed not feasible, minimum 6 energy star gas system shall be considered and all distribution pipe work to be insulated; to further reduce hot water consumption, the following fittings and fixtures are required:
    - Tap – 6 Star WELS
    - Showerhead – 3 Star WELS (> 6.0 <=7.5 L/M)

Relevant Manly DCP Criteria	Relevant Section-J DTS Provisions	Additional Project Specific Requirements
1-Paragraph 3.5.2: **AVOID energy needs via building *fabric* design** **2-Paragraph 3.5.2:** **OFFSET energy needs via alternative systems** **3-Paragraph 3.5.4:** **REDUCE energy needs via improved efficiency of the operational systems**	J1 – Provision of *insulation* requirement to minimise heat gain/loss, AVOID unnecessary cooling, heating & ventilation system loads J1 – Provision of *light-coloured roof* requirement to reduce solar absorption and AVOID cooling needs J1 – Provision of *glazing* requirement to control heat transfer and solar gain through the glazing elements, AVOID cooling & heating loads J3 – Provision of *sealing* requirement to avoid unnecessary infiltration losses, which AVOID cooling & heating loads J5 – Provision of *mechanical equipment* efficiency requirement to REDUCE cooling, heating & ventilation demands. J6 – Provision of *electrical equipment* requirement to REDUCE energy demands for lighting, water and transportation systems J7 – Provision of *heated water equipment* efficiency requirement to REDUCE energy demands for heated water systems J8 – Provision of *energy monitoring equipment* requirement to assess system efficiency and allows for ongoing improvement to AVOID & REDUCE energy consumption	○ Solar PV panels – proposed 5kWp alternative system to OFFSET energy consumption ○ Solar hot water – potential alternative energy option to OFFSET energy demand if hot-water taps to be provided to amenities showers ○ Waste heat reclamation – Trigeneration /Cogeneration systems are not suitable alternative energy options for the scale and nature of the project ○ HVAC systems - Install min. 4 energy star for packaged system AND variable speed drive (VSD) for other system types, to reduce operational energy ○ Ceiling fans – Install ceiling fans to improve distribution effectiveness of internal chilled and heated air, reduce energy demand from broader control conditioned temperature band ○ Electrical appliances – system rating to be within 1 star of best available at time to reduce operational energy ○ Gas heater – system rating to be within 1 star of best available at time to reduce operational energy

3.3 Overshadowing Solar Collector System

In response to DCP Paragraph 3.5.2, the solar collector system for the proposed development retains its shadow profile within the site boundary for more than 6 hours daily all year around and it does not have any adjoining neighbours within the East, South and West aspect of the building, hence this DCP clause is not relevant. Refer to Figure-3 for building & solar PV shadowing profile during summer & winter solstices.

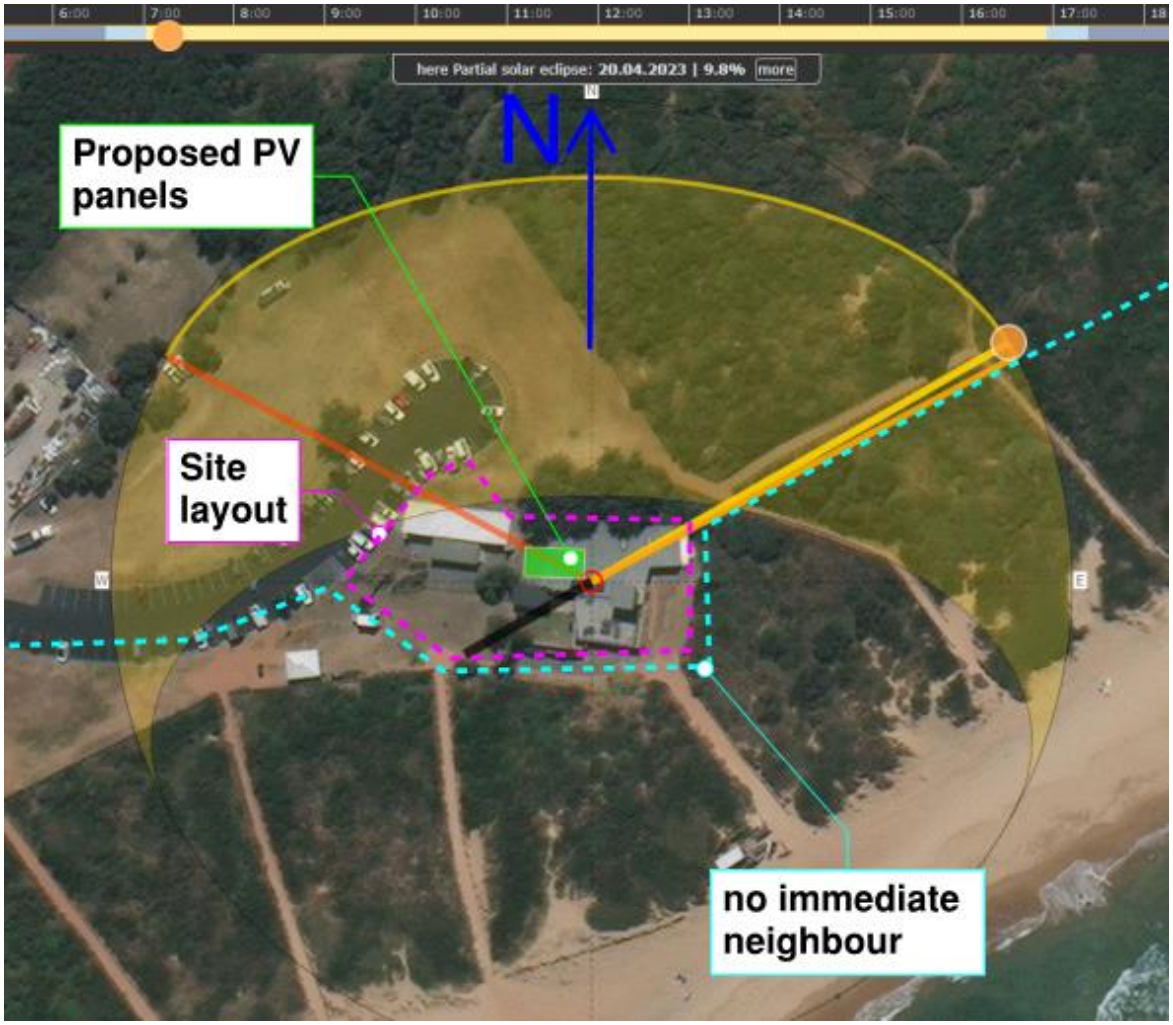


Figure 2 www.suncalc.org

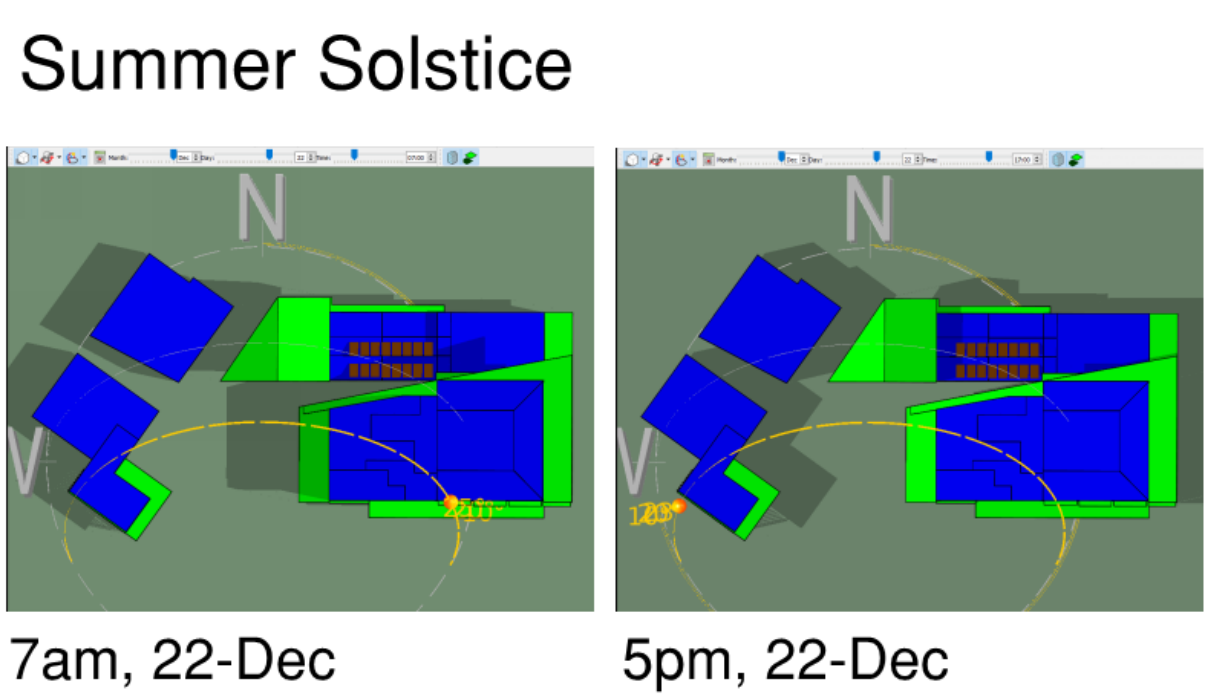


Figure 3 Summer & winter solstices - PV shadowing profile contained within its building boundary throughout the year

3.4 Section-J Compliance

The project is committed to achieve the following compliance requirements under NCC2019 Section J provisions.

3.4.1 Part J1.1 - Building Fabric

Building Element	DTS Min. Required	Proposed Design Commitment
New Metal Roof	Rt3.70 (downwards)	Same as DTS or better
New Cladded Wall	Rt1.0 to 1.40	Same as DTS or better
Slab-on-ground Slab	Rt2.0	Same as DTS or better
Suspended Slab	Rt2.0	Same as DTS or better
Wall Sarking	R0.20	Same as DTS or better

3.4.2 Part J1.2 - Glazing

Provision of high-performance glazing systems to be equal or better than Deemed-to-Satisfy (DTS) specification. Detailed façade & glazing assessments to be performed during DA phase section-J assessment.

3.4.3 Part J3 - Building Sealing

Building Element	Comment
New Entry Doors	Must be self-closing provided with weather seals.
New Exhaust Fans	Must have self-closing dampers.
Bi-Fold Doors	Any bi-fold doors must be interlocked to ensure the air-conditioning system is inactive when these doors are open.
Open Shop Front	Ensuring the last air conditioning outlet is at least 3 meters front he front entrance and all other door are self-closing.
Roof Lights	A roof light must be sealed when serving a conditioned space and must be constructed with an imperforate ceiling diffuser or a weatherproof seal if it is a roof window, or a readily operable shutter system.
Roof, Walls & Floor	Minimise air leakage by enclosed or internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking, skirting, architraves, cornices or the like.

3.4.4 Part J5 – Airconditioning & Ventilation Systems

Provision of mechanical systems equal or better than DTS requirement.

3.4.5 Part J6 – Artificial Lighting & Power

Provision of lighting & electrical systems equal or better than DTS requirement.

3.4.6 Part J7 – Heated Water Supply & Swimming Pool & Spa Pool Plant

Building Element	Comment
New Hot Water Taps	Specifying all new hot water taps with a minimum rating of 3 stars and timeclocks to zip type instantaneous water heaters.

3.4.7 Part J8 – Facilities for Energy Monitoring

Monitoring	Comment
Energy Monitoring	Standard electricity and gas metering to record time-of-use consumption is sufficient, i.e., smart meters

4 DESIGN SUMMARY

The design approach as referred to in this report has been prepared against the Manly Development Control Plan and provided a high-level overview of the proposed project's environmentally sustainable design strategies and proposed energy efficiency components.

In response to requirements outlined within energy reduction criteria of Part D22, Warringah Development Control Plan, *AND* Northern Beaches Council – DCP Paragraph 3.5.6 Figure 17 for non-residential development, the report has included:

- Effective solar access & passive ventilation design to enhance passive lighting, heating & cooling, and address project sustainable design response;
- An outline of DCP energy efficiency requirements and greenhouse gas emission reduction measures through combination of NCC section-J provisions design and project specific proposed strategies, to achieve AVOID, REDUCE and OFFSET in energy consumptions;
- Explanation of suitable onsite alternative energy system selection;
- Assessment of overshadowing impact of adjoining properties;

In summary, based on the proposed design strategies and the commitment to full NCC section-J compliance, we believe the project will achieve the sustainable development and energy/ GHG emission hierarchy action design as stipulated under Manly DCP 2013 provision.

Manly DCP Criteria	**Proposed Compliance Strategies**	**DCP Compliance Achieved?**
Paragraph 3.5 - Objectives to minimise energy needs & environmental impact through hierarchy actions: - *AVOID / REDUCE / OFFSET*	NCC Section J - J1 to J8 DTS compliance design requirements to *AVOID* & *REDUCE* energy/emission Additional Proposed Strategy – Assess and select practical alternative energy source to *OFFSET* energy/emission	Yes
Paragraph 3.5.2- Strategies to AVOID & OFFSET energy consumption: **-PV solar cells** **-Solar hot water** **-Waste heat reclamation** **-Passive strategy** **-Environmental impact**	NCC Section J – J1 & J3 DTS compliance building fabric design requirements to *AVOID* energy/emission Additional Proposed Strategy – Proposed additional PASSIVE building fabric design to *AVOID* energy/emission, include daylighting, passive heating & natural ventilation Additional Proposed Strategy – Assessed and selected suitable ALTERNATIVE energy source to *OFFSET* energy/emission, include PV solar, waste heat reclamation and solar hot water	Yes
Paragraph 3.5.4 -Strategies to REDUCE operational energy: **-Lighting & Electrical systems** **-Electrical Appliances** **-Mechanical systems** **-Gas heaters**	NCC Section J – J5-8 DTS compliance building operational system requirements to *REDUCE* energy/emission Additional Proposed Strategy – Proposed additional ELECTRICAL APPLIANCES requirements to *AVOID* energy/emission Additional Proposed Strategy – Proposed minimum HVAC energy star rating and additional CEILING FAN requirements to *AVOID* energy/emission	YES