ESD REPORT

NEWPORT SURF LIFE SAVING CLUB RENEWAL

PREPARED FOR
NORTHERN BEACHES COUNCIL

DATE: 11TH SEPTEMBER 2020

OUR REFERENCE: 200308-B

AUTHOR: WILLY TANGTRA

Author	**Willy Tangtra**	
REVISION	**DATE**	**DESCRIPTION**
A	23rd April 2020	Preliminary Issue
B	11th September 2020	Development Application

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1 EXECUTIVE SUMMARY

Greenview Consulting Pty Ltd has been engaged by Adriano Pupilli Architects to provide a qualitative Ecologically Sustainable Design (ESD) assessment during the development application stage of the proposed development located at 394 Barrenjoey Road, Newport. This report will support the development application to the Northern Beaches Council.

The project is a refurbishment to a two-storey existing building. The proposed development will comprise the following:

- Gear Storage Compound
- New Amenities
- Admin Rooms
- Kitchen
- Hall
- Committee Room
- Training Rooms

The proposed development will incorporate passive and active energy savings measures to meet the sustainability design target. Overall, positive Ecologically Sustainable Design (ESD) and energy efficiency features are currently in place in a number of design areas, incorporating the following:

- Numerous façades opening to provide opportunities to make use of wind-induced natural ventilation throughout the year thereby minimising energy cost.
- Installation of shading devices to minimise unwanted solar heat gain from the summer sun thereby minimising energy cost.

The following recommendations have been made to improve upon the existing key sustainability elements of the proposed development:

- Renewable energy including PV solar panels implemented on the roof
- The mechanical ventilation system should be designed bearing in mind the following energy conservation recommendations:
  - Any air conditioning system should have a coefficient of performance (COP) greater than 3.5.
  - Time clocks should be incorporated and programmed with hours of usage (building operational hours) to minimise unnecessary space conditioning and ensuing economic and environmental costs.
  - Air leak seals should be provided on all external doors and glazing.
- Roof and ceiling insulation to satisfy minimum NCC Section J requirements
- External and internal walls insulation to satisfy NCC Section J Requirements
- Solar-powered gas boosted hot water system
- Water efficient bathroom and kitchen fittings
- High energy efficient lamps should be installed such as LED lights and compact fluorescent lights.

With the recommendations contained within this report we found that the proposed development is able to achieve the relevant National Construction (NCC) 2019 Section J requirements.

It is recommended that ESD initiatives continue to be developed and implement during the detailed design stage of the project.

2 INTRODUCTION

2.1 General

Greenview Consulting Pty Ltd has been engaged by Adriano Pupilli Architects to provide a qualitative Ecologically Sustainable Design (ESD) assessment during the development application stage of the proposed development located at 394 Barrenjoey Road, Newport. This report will support the development application to the Northern Beaches Council. This report shall be read in conjunction with Manly DCP 2013 Amendment 11 and National Construction Code Building Code of Australia 2019 Volume 1.

This report will identify how the proposed development will comply with:

- Manly Development Control Plan (DCP) 2013 Amendment 11 Section 3.5
- NCC BCA 2019 Section J requirements

- **ARCHITECTURAL DOCUMENTATION**

- The following architectural documentation from **Adriano Pupilli Architects** was used for this assessment;
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Job No.	Drawing No.	Drawing Title	Rev	Date
NSC	004	Demolition Plan	A	02/09/2020
NSC	005	Existing Ground Floor Plan	A	02/09/2020
NSC	006	Existing First Floor Plan	A	02/09/2020
NSC	007	Existing Roof Plan	A	02/09/2020
NSC	008	Existing Section	A	02/09/2020
NSC	009	Existing Elevations	A	02/09/2020
NSC	010	Proposed Ground Floor Plan	A	02/09/2020
NSC	011	Proposed First Floor Plan	A	02/09/2020
NSC	012	Proposed Roof Plan	A	02/09/2020
NSC	013	Proposed Section	A	02/09/2020
NSC	014	Proposed Elevations	A	02/09/2020
NSC	015	Schedules of Colours and Materials	A	02/09/2020

2.2 Project Description

The proposed refurbishment is located within the Newport Beach. It is a refurbishment to a two-storey existing building. The proposed development will comprise the following:

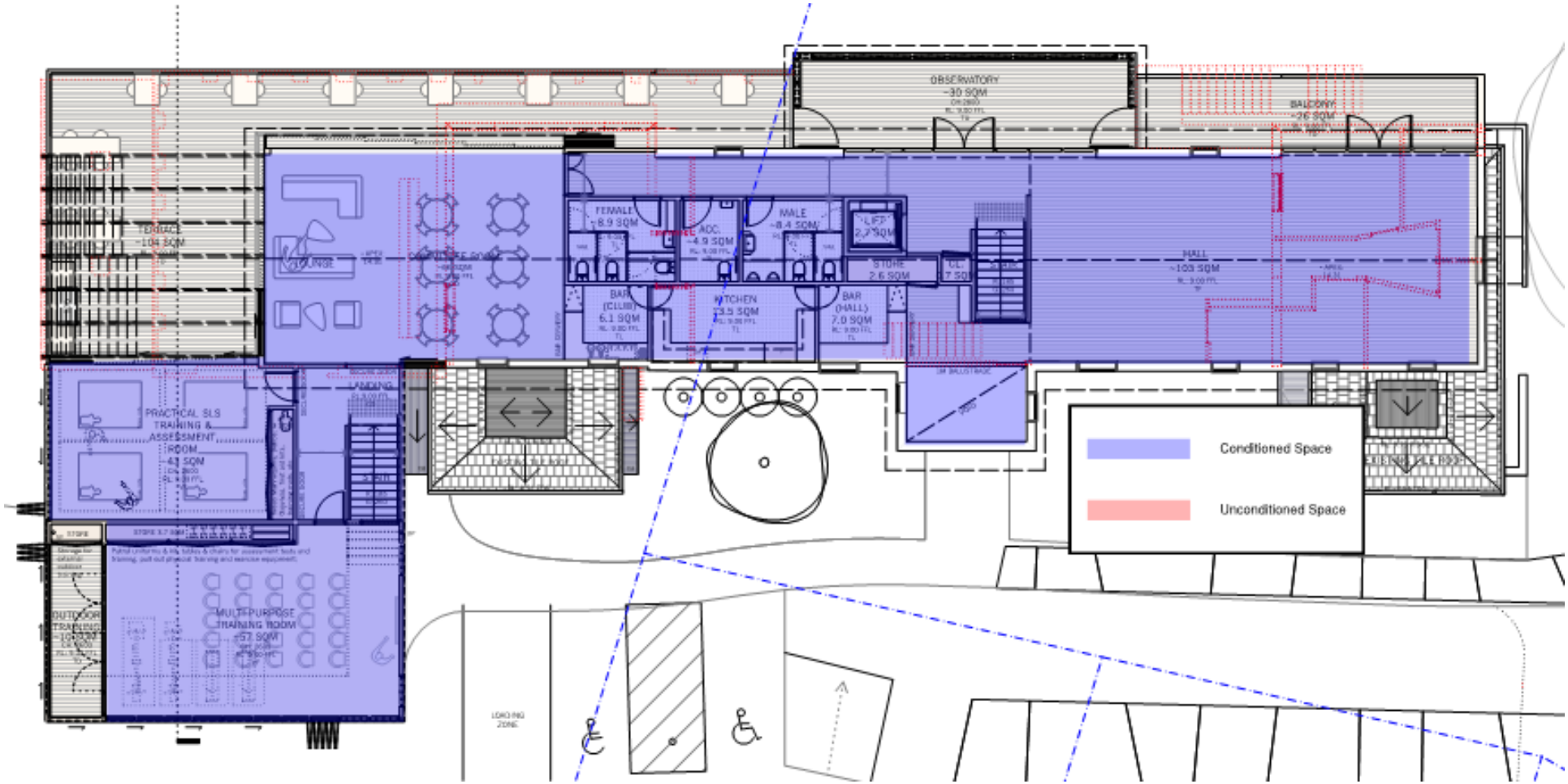
- ❖ Gear Storage Compound
- ❖ New Amenities
- ❖ Admin Rooms
- ❖ Kitchen
- ❖ Hall
- ❖ Committee Room
- ❖ Training Rooms

- **BUILDING CLASSIFICATION & CLIMATE ZONE**

- Class 5, Zone 5

- **Figure 1: Proposed site plan**

- **Figure 2: Proposed Ground plan**



- **Figure 3: Proposed First Floor plan**

3 ESD OBJECTIVES

3.1 Manly DCP Section 3.5 Requirements

Section 5(a)(vii) of the Environmental Planning and Assessment Act 1979 encourages ecologically sustainable development. Council require that the principles of Ecologically sustainable development has been taken into consideration when determining development application under section 79C of the Environmental Planning and Assessment Act 1979 and under this plan.

Relevant objectives in relation to this part include the following:

I. To encourage the retention and adaptation of existing dwelling including a preference for adaptive reuse of buildings rather than total demolition. When retention and adaption is not possible Council encourages the use of building materials and techniques that are energy efficient, non-harmful and environmentally sustainable.

II. To minimise waste generated by development and embodied in the building materials and process through demolition

III. To encourage energy efficient building design, construction and practice, that reduce energy consumption (primarily for heating and cooling), reduce the use of non-renewable fossil fuels, minimise air pollution, greenhouse gas emission and reduce energy bills.

IV. To optimise solar access to land and building.

V. 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.

3.2 NCC BCA Section J Requirements

The proposed development will be designed and constructed in accordance with the Building Code of Australia (BCA) 2019 Volume 1 Section J. The objective of NCC BCA 2019 Volume 1 Section J is to reduce greenhouse gas emissions by efficiently using energy.

The proposed development is predominantly classified as a Class 5 building. The building will be designed and constructed to comply with performance requirements through the application of the following energy efficiency clauses:

- **Part J1 Building Fabric** – building envelope minimum thermal insulation levels.
- **Part J3 Building Sealing**
- **Part J5 Air-conditioning and Ventilation Systems** – minimum energy efficiency levels for mechanical systems
- **Part J6 Artificial Lighting and Power** – minimum energy efficiency levels for lighting and power
- **Part J7 Heated Water Supply**
- **Part J8 Facilities for Energy Monitoring** – e.g. energy sub-metering

4 ESD INITIATIVES FOR THE PROPOSED DEVELOPMENT

In order to achieve a structured integrated approach to ESD, a series of indicators and strategic goals have been identified at the outset to be communicated to the design team. Greenview Consulting's role, as the project's ESD consultant, has been to apply these principles to all aspects of the development ensuring a best possible ESD outcome.

ESD indicators identified for the proposed DA plan are:

- Site Layout and Building Design
- Energy Efficiency
- Water Conservation
- Indoor Environment Quality
- Building Materials
- Building Sealing
- Greenhouse Gas Emissions; and
- Management practices.

The following strategies have been considered in order to meet the ESD objectives as outlined in the following sections below:

4.1 Site Layout and Building Design

A key ESD objective should be able to optimise site conditions and minimise energy consumed for cooling and heating through proper selection of building orientation and internal layout.

As the project involves maintaining existing building layout, achieving this point is particularly challenging. The following recommendations are noted with respect to the new portion of the building that includes MPR and SLS training rooms which incorporates a huge expanse of glazed element in the north, east and west façade.

- Including horizontal shading (overhang) to north to shield against high altitude summer sun while still allowing winter sun to penetrate through the space.
- Including vertical shading (louvres) to the east and west to reduce the irradiation and glare from the afternoon summer sun.

In relation to key characteristics of the Sydney Surrounds Region Wind Climate relevant to the wind impact assessment of the proposed development, we note that Sydney Surrounds is affected by two primary wind seasons:

- Summer winds occur mainly from the northeast, southeast and south. While northeast winds are the more common prevailing wind direction (occurring typically as offshore land-sea breezes), southeast and south winds generally provide the strongest gusts during summer.
- Winter/Early spring winds occur mainly from the west and the south west quadrant winds (southwest to northwest) provide the strongest winds during winter and in fact for the whole year.

The proposed development has been provided with numerous façades opening, particularly in first floor level which gives opportunities to make use of wind-induced natural ventilation and cooling throughout the year, when appropriate. This in turn will decrease the energy consumed for cooling and heating of space.

4.2 Energy Efficiency

The federal government has mandated a phased out of incandescent lighting technology and placed minimum standard on fluorescent lamps. However, there are additional ways to further reduce emission in electrical energy consumption which are outlined below:

- New electrical appliance must be rated no less than one star below the maximum star rating available for that appliance type on the Energy Star rating scheme at the time of installation. The energy star rating labels can be seen
- New electrical appliance must be rated no less than one star below the maximum star rating available for that appliance type on the Energy Star rating scheme at the time of installation. The energy star rating labels can be seen from www.energyrating.gov.au and www.energystar.gov.au.
- New air-conditioning system shall have minimum coefficient of performance of 3.5.
- New gas heater must be rated no less than one-star energy rating below the maximum star rating available at the time of installation. The energy star rating labels can be seen from www.energyrating.gov.au and www.energystar.gov.au.
- Demand reduction lighting technology and energy efficient lighting, such as LED and compact fluorescent to be used instead of tungsten light.
- New or replacement hot water systems of domestic/residential scale must be solar hot water system.

4.3 Water Conservation

As urbanisation results in significant volumes of imported potable water from Warragamba Fam and large volumes of generated wastewater discharge to the environment at North Head wastewater treatment plant. Significant financial, social and sustainability benefits exist through local adoption of water conservation measures.

All new water use fittings must demonstrate compliance with the minimum standards defined by the Water Efficiency Labelling and Standards (WELS) Scheme. Minimum ratings recommended under this scheme include:

- 3-star showerheads
- 3-star urinals
- 4-star dual-flush toilets; and
- 4-star taps (for all taps other than bath outlets and garden taps)

4.4 Indoor Environment Quality

Achieving enhanced Indoor Environment (IEQ) ensures that the building and building services are designed and managed to benefit the health and well-being of building occupants and visitors.

4.4.1 Asbestos

It is recommended that Asbestos identification and removal procedures be included in the site Environmental Management Plan where required.

4.4.2 Internal Noise Levels

Internal noise levels are a significant factor in determining occupant satisfaction and wellbeing. The aim of controlling internal noise levels is to encourage and recognise buildings that are designed to maintain noise level at an appropriate level. Greenview Consulting recommends that all future development in the proposed site meet the recommended criteria and measures provided in accordance with the relevant NCC requirements.

4.5 Building Materials

4.5.1 External Walls

The existing external walls are predominantly 230mm thick masonry. Subsequent additions made to the building are perimeter cavity walls. Lightweight cladding will be added to infill walls within the existing parts of the building.

The proposed new external walls will be fibre cement sheet cladded walls. Greenview Consulting recommends implementing insulation of external walls with an R-value greater than is required with National Construction Code (NCC) 2019 Section J to reduce heat gain/loss through the walls.

See Section 4.7 for Section J Compliant Fabric.

4.5.2 Internal Walls

Internal walls are recommended to be lightweight plasterboard on stud construction with acoustic insulation where required. Where internal walls lie in between conditioned and unconditioned area, insulation will be required. Insulation for the internal walls was assessed in accordance with National Construction Code (NCC) 2019 Section J requirement.

See Section 4.7 for Section J Compliant Fabric.

4.5.3 Roof and Ceiling

The existing building has a tiled pitch roof construction roof construction. The existing tiled roof will be extended give additional shading to the lounge area.

The new additional training rooms will have a low-profile metal roof. Greenview Consulting recommends implementing insulation between roof and ceiling with an R-value greater than is required with National Construction Code (NCC) 2019 Section J to reduce heat gain/loss through the roof

See Section 4.7 for Section J Compliant Fabric.

4.5.4 Glazing

High performance glazing, as required by NCC Section J, will reduce the solar heat gain from north, east and western façade while still allowing sufficient daylighting to penetrate through. Greenview recommends the usage of Double-Glazed type windows to reduce heat gain/loss through the façade.

See Section 4.7 for Section J Compliant Fabric

4.5.5 Floor

In accordance with site inspection done by Partridge on 23/5/18, both ground floor and first floor have concrete slab construction. Concrete slab is recommended as it has high thermal mass. Material with high thermal mass has the ability to store heat energy and then release it slowly to the room. This storage effectively smooths out daily temperature variations within conditioned spaces, with corresponding reduction in both heating and cooling loads.

See Section 4.7 for Section J Compliant Fabric

4.6 Building Sealing

Building sealing is important to ensure that unprecedented heating and cooling load will not be introduced through building leakage.

A seal to restrict air infiltration must be fitted to each edge of an external door, operable external window or the like when serving a conditioned space in the proposed development. The seal may be a foam or rubber compressible strip, fibrous seal or the like.

The amenities exhaust fans must be fitted with as sealing device such as a self-closing damper or the like.

4.7 Greenhouse Gas Emission

As global warming and climate change effects becoming more prominent in todays world, an effective systematic quantitative way to reduce of greenhouse gas emission is required. The objective of NCC BCA 2019 Volume 1 Section J is to reduce greenhouse gas emissions by efficiently using energy particularly energy consumption in heating and cooling the space within building envelope.

This section how the proposed redevelopment of Newport Surf Life Saving Club can meet the requirements of the NCC BCA 2019 Volume 1 Section J.

Section J compliance is only required for all new building work including fabric and services. The new building work should not reduce the existing building's level of energy efficiency.

All existing construction will not need to be upgraded to Section J requirements. Only the fabric (glazing and walls) on the envelope that is new need comply with this report. Where the new work provides access to the existing roof cladding, wall cladding or wall lining, insulation should be added where practical to comply with this Part.

4.7.1 NCC BCA 2019 Section J - JP1 Performance Requirements

A building, including its services, must have, to the degree necessary, features that facilitate the efficient use of energy appropriate to—

a. the function and use of the building and services; and
b. the level of human comfort required for the building use; and
c. solar radiation being –
    i. utilized for heating; and
    ii. controlled to minimize energy for cooling; and
d. the energy source of the services; and
e. the sealing of the building envelope against air leakage; and
f. for a conditioned space, achieving an hourly regulated energy consumption, average over the annual hours of operation, of not more than –
    i. for a Class 6 building, 80 kJ/m^2.hr; and
    ii. for a Class 5, 7b, 8 or 9a building other than a ward area, or a Class 9b school, 43 kJ/m^2.hr; and
    iii. for all other building classifications, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, 15kJ/m^2.hr

JP1 is verified using verification method JV3 – Verification using a reference building

4.7.2 Disclaimer

The simulation software used was IES Virtual Environment version 2019.0.1.0 in accordance with Australian Building Codes Board (ABCB) Protocol for Building Energy Analysis Software.

Computer simulation provides an estimate of performance. This estimate is based on simplifications that do not and cannot fully represent all the intricacies of performance once built. As a result, simulation results only represent an interpretation of the potential performance. No guarantee or warrantee of performance in practice can be based on simulation results alone.

4.7.3 Compliance Requirements

Building Element	Proposed Building
Roof and Ceiling	**Total R3.7** – New Tiled Roof **Total R3.7** – New Metal Roof **No Additional Insulation Required –** Existing Tiled Roof
Roof Colour (Solar Absorptance)	**SA** ≤ 0.7 – New roof
Roof Lights	**N/A** - None
External Walls	**No Additional Insulation Required** – Existing Masonry Wall **Total R2.8** – New Masonry Wall **Total R2.8** – New Fibre-Cement Cladded Masonry Wall
External Walls (Solar Absorptance)	**SA** ≤ 0.5 **–** New external walls
Internal Walls	**Total R1.8** – Concrete walls adjacent to lifts (See Appendix B for details)
Floors	**No Additional Insulation Required –** Concrete slab on ground **No Additional Insulation Required –** Suspended slab over air **No Additional Insulation Required –** Suspended slab over storage
Glazing (all)	**U-Value 4.5, SHGC – 0.50** (Single Glazed Low E Clear) **Note:** U-Value and SHGC must be less than or equal to the above
Services	DTS compliant systems

4.7.4 Simulation Results

Performance Requirements JP1 is verified when it is determined that the annual energy consumption of the proposed building with its services is not more than the annual energy consumption of a reference building when—

(i) the proposed building is modelled with the proposed services

(ii) the proposed building is modelled with the same services as the reference building

Compliance is achieved when Criteria 1 and 2 are both met;

JV3 Criteria 1 – Result A < Result C

JV3 Criteria 2 – Result B < Result C

where **A** – Energy Consumption of Proposed Building Fabric and Proposed Services

B – Energy Consumption of Proposed Building Fabric and Deemed to Satisfy Services

C – Energy Consumption of Deemed to Satisfy Fabric and Deemed to Satisfy Services

TABULATED RESULTS

Scenarios	Annual Electrical Energy Consumption (MWh)	Annual GHG Emission (kgCO2)
A	80.5758	74,258
B	80.5758	74,258
C	81.7987	75,385
Criteria 1	A < C	✓
Criteria 2	B < C	✓
JV3 Compliance Achieved		

In accordance with Table 3a of Section J in BCA 2019 Volume 1, the greenhouse gas emission factors for electricity energy source in NSW is given as 256 kgCO2 / GJ. Using this factor, the amount of greenhouse gas emission annually is calculated.

The reference building modelled with DTS fabric and services as per JV specification is simulated to consume total electrical energy of **81.7987MWh** annually which is equivalent to emission of **75,385 kg CO_2** annually.

The proposed building design shall include services that are at least as efficient as the BCA DTS services. The computer simulation has assumed worst case scenario where the proposed services performs as efficient as the DTS services. A **3kW PV system** has also been incorporated in the modelling to help offset the energy consumption of the building, The PV system is calculated to generated **3.858 MWh** of electricity annually.

The proposed building modelled with the same DTS services consume total electrical energy of **80.5758 MWh** annually which is equivalent to emission of **74,258 kgCO2** annually.

The proposed building has achieved compliance with Performance Requirements JP1 as the values for A and B are less than C.

By incorporating the recommendations of this report the building and its services can be capable of efficiently using energy. The annual total greenhouse gas emission by approximately 1.1% in comparison to similarly build reference building. Further reduction in emission could be done incorporating services and light fitting with higher efficiency.

4.8 Management Practices

Building management helps to reduce greenhouse gas emissions and energy consumption through adequate commissioning and user guides. It is also to reduce environmental impact during construction activities.

Manly DCP section 3.5.6.1 has suggest following the National Australian Built Environment Rating Scheme (NABERS) that is managed by the NSW office of Environment Heritage.

The key environmental categories covered under NABERS include:

a) Energy use and greenhouse emissions;

b) Water use;

c) Waste; and

d) Indoor environment.

The NABERS scheme is voluntary and not mandatory but it is a good measure to see how a building perform within the industry standard. It compares the performance of the building to benchmarks that represent the performance of other similar buildings in the same location. The rating takes into account, the climate where the building operates, building operational hours, energy sources its used, building size and occupancy.

The proposed building will be simulated to the upmost reflection of the future built building. The same building services system, fittings and building management control system as what is going to be installed in the future. This essentially creates a digital twin of the building that can be compared with real-life data such as energy bills when the building is commissioned.

NABERS ratings are valid for twelve months.

5 RENEWABLE ENERGY OPTIONS

As the worldwide demand for fuel increases, alternative and renewable energy sources are emerging as economical and sustainable options. Alternative renewable energy sources are becoming more attractive options because of increased global demand for fuels, environmental responsibility, affordability and new local, state and federal government legislations.

5.1 Photo Voltaic System

Greenview Consulting has assessed the potential for installation of an optimal Photo Voltaic (PV) system for the site. PV system highly recommended as its energy supply rate complements with the energy demand profile of the building.

The following features were considered in order to assess the optimum location of the solar panels:

- Orientation and inclination angle of the solar panels are highly important to obtain the highest solar irradiation on the panel. Ideally, the PV panels will be mounted on the roof facing north with pitch angel that is equal to the latitude of the location where it is installed (33^0).
- The new metal roof is suitable for PV panels installation. Roof area is approximately 115 m^2.

Our initial PV installation study has shown that that the site has potential for at least 3kW PV solar installation.

Greenview recommends conducting a detailed renewable energy efficiency study for the proposed site during the development stage.

6 CONCLUSION

A qualitative ESD assessment during the development application stage of the proposed refurbishment of Newport Surf Life Saving Club. The project is a refurbishment to a two-storey existing building. The proposed development will comprise the following:

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- External and internal walls insulation to satisfy NCC Section J Requirements
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- Water efficient bathroom and kitchen fittings
- High energy efficient lamps should be installed such as LED lights and compact fluorescent lights.

With the recommendations contained within this report we found that the proposed development is able to achieve the relevant National Construction (NCC) 2019 Section J requirements.

It is recommended that ESD initiatives continue to be developed and implement during the detailed design stage of the project.