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## **Energy Efficiency Performance Report**

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### **Proposed Residential Building 3 Central Road Avalon NSW**

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## Document Control

Revision	Date	Description
1	29 November 2019	Draft
2	4 December 2019	Updated based on Cottee Parker solar analysis
Final	9 December 2019	Issued

## 1 General

### 1.1 Introduction

This report has been prepared as requested in the DA Lodgement Checklist of Northern Beaches Council. It examines the energy efficiency of the proposed building at 3 Central Avenue Avalon.

The building has two levels of apartments with basement car parking. There are 8 dwellings.

The report is based on the details supplied on the architectural drawings and related documentation prepared by Cottee Parker JPRA.

### 1.2 Methodology

The thermal performance of the sole occupancy units (SOU) have been assessed using NatHERS (Nationwide House Energy Rating Scheme) protocols using computer simulation and these results are presented on the NatHERS Certificates and also on the BASIX Certificate. BERS Pro 4.3 software was used for this analysis.

The services, appliances, fixtures etc. referenced in this report are based on BASIX Certificate 1056875M issued 9 December 2019 - prepared by Gradwell Consulting.

### 1.3 Building Class

The building has been assessed as Building Class 2 (SOU) and Class 7a (carpark).

### 1.4 Climate Zone

The building is located at Avalon so the site is NatHERS Climate Zone 56.

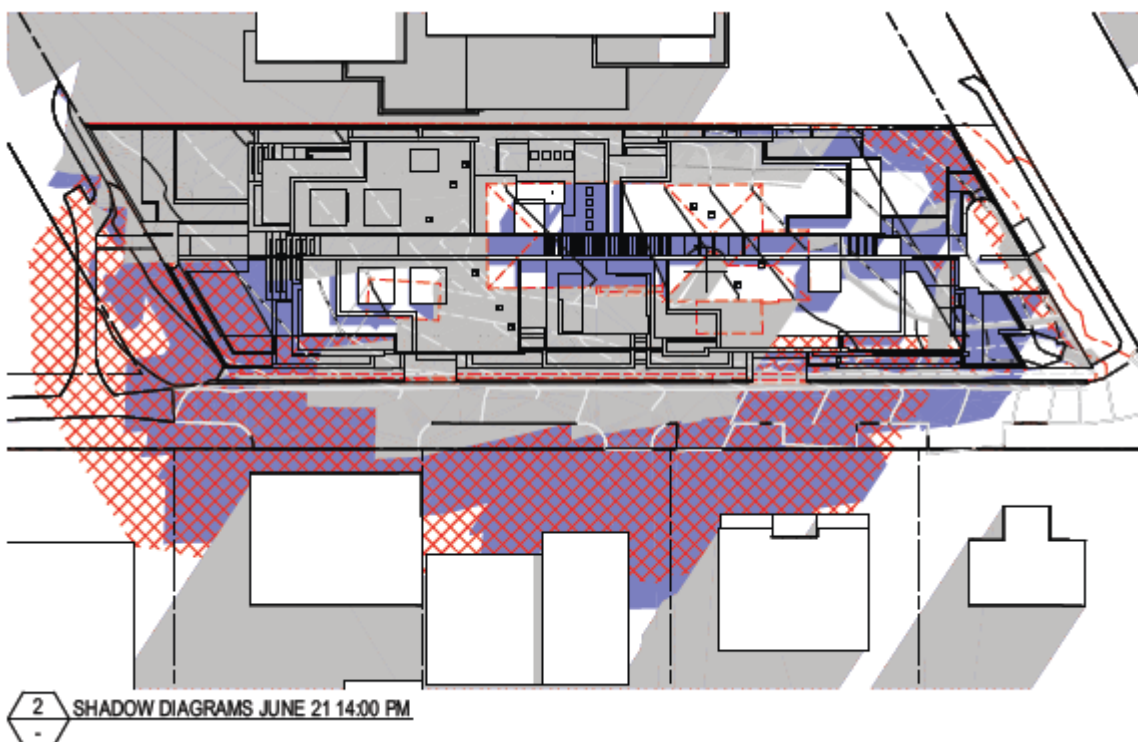
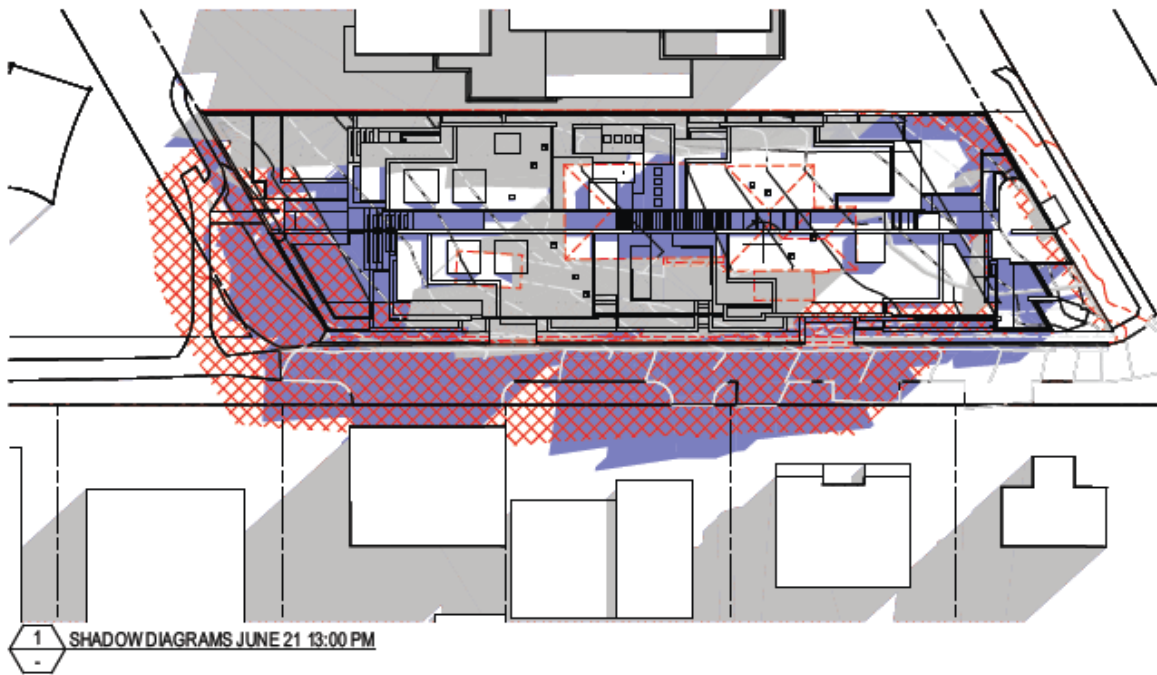
### 1.5 Analyst Qualifications

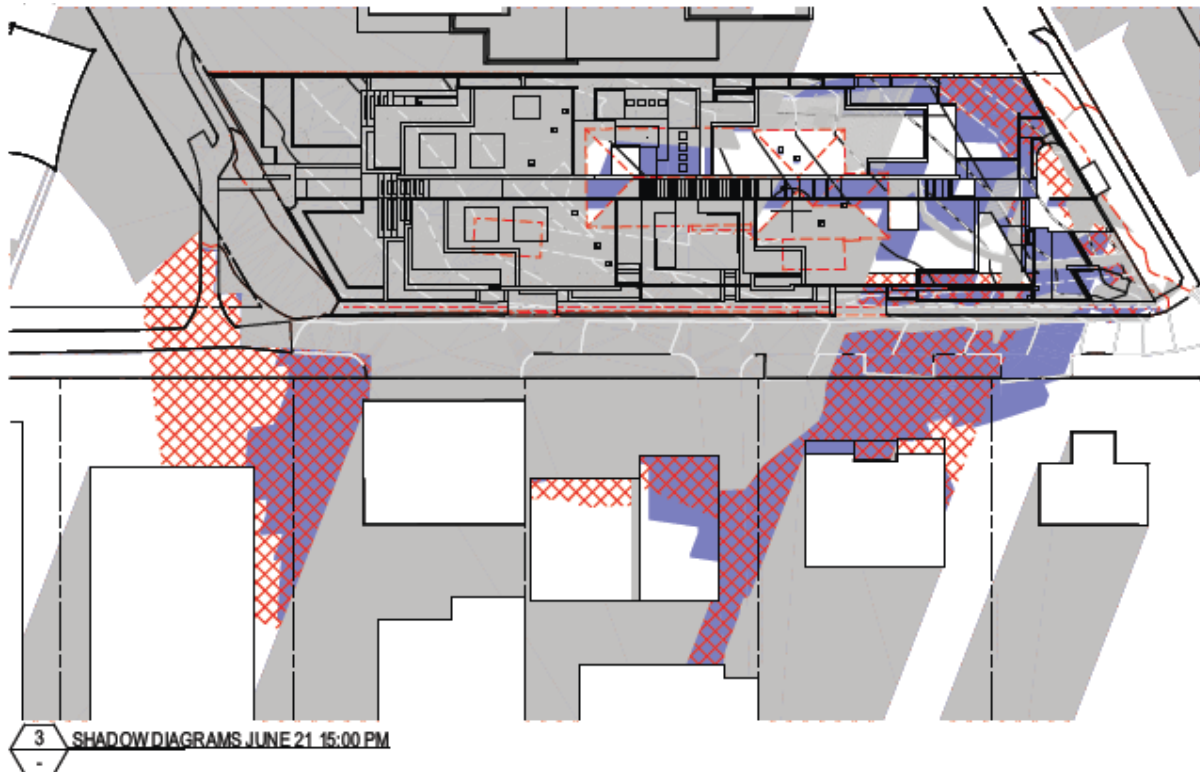
The analysis has been undertaken by David Gradwell, Principal of Gradwell Consulting. David has a Bachelor of Engineering Degree (Civil) from the University of Queensland and is a former Member of the Institute of Engineers Australia. He has extensive experience in computer modelling of residential buildings (NatHERS) and commercial buildings using programs such as BERS Pro, DesignBuilder and EnergyPlus.

## 2 Solar Access

### 2.1 Sun Study

The complete sun study prepared by Cottee Parker JPRA is included in the architectural drawings - the diagrams showing 1 pm, 2 pm and 3 pm on 21 June are included below.





## 2.2 Residential Apartments

Analysis by Cottee Parker JPRA shows that 6 apartments receive two or more hours sun on 21 June. This is 75% of all apartments. The results are summarised in the following table:

## 2.3 Solar Hot Water

In accordance with the BASIX Certificate, no solar hot water is proposed.

## 2.5 Clothes Drying Areas

No common clothes drying areas are proposed.

## 3 Energy Efficiency Design

### 3.1 Principles

The following design factors contribute to energy efficiency:

- solar gain and external shading
- building envelope performance
- natural ventilation
- lighting
- appliances
- HVAC
- Renewable Energy

### 3.2 Solar Gain and External Shading

Four of the eight apartments have good solar gain due to North facing balconies and glazing. This solar gain is taken into account by the NatHERS simulation.

### 3.3 Building Envelope Performance

The external walls of the proposed building are masonry construction. This provides better thermal mass than lightweight systems. Insulation will be added to external walls, roof/ceilings and floors as specified in the NatHERS documentation.

Glazing in the residential apartments is a combination of “double clear” (apartments 1, 2 and 5) and “single clear” elsewhere.

### 3.4 Natural Ventilation

All apartments have very good cross flow ventilation with facades facing three directions.

### 3.5 Artificial lighting

Efficient artificial lighting is recommended throughout. The BASIX Certificate specifies LED for the residential apartments, common corridors and car park with time clocks and motion sensors for the car parks.

### 3.6 Appliances

The BASIX Certificate specifies that the residential apartments have efficient gas cooktops and electric ovens, 3.5 star dishwashers and 2 star clothes dryers.

Although not included in the BASIX Certificate, it is recommended that purchasers be encouraged to select energy efficient refrigerators and washing machines.

### 3.7 HVAC

The BASIX Certificate specifies 3 phase air-conditioning for the residential apartments with living and bedrooms separately zoned. The air-conditioning will have EER/CoP ratings between 2.5 and 3.0. Residential corridors are not mechanically ventilated. The BASIX Certificate specifies variable speed fans for car park exhaust with carbon monoxide monitors.

### 3.8 Renewable Energy

The BASIX Certificate specifies a 5.6 kW peak photovoltaic (PV) system which will be used for central services.

## 4 Hot Water System

### 4.1 Principles

Solar hot water offers the option of using renewable energy for at least part of the demand.

### 4.2 System Selection

According to the BASIX Certificate, hot water for the residential apartments will be provided by individual instantaneous gas systems. Although instantaneous gas is more energy efficient and results in lower greenhouse gas production than electric heating, it is inferior to solar.

## 5 Clothes Dryers

### 5.1 Principles

Natural (solar) drying of clothes should be encouraged and efficient clothes dryers should be provided in apartments.

### 5.2 System Selection

According to the BASIX Certificate, the electric clothes dryers provided in each residential apartment have a star rating of 2.0. Higher efficiency heat pump technology 6 star dryers would improve the energy efficiency.

Consideration should be given to selecting the highest performing clothes dryer available for the budget when appliances are selected.

## 6 Overshadowing of Adjoining Properties

### 6.1 General

Overshadowing of adjoining properties occurs during the afternoon in winter. Refer to the sun study by Cottee Parker JPRA for more information.

## 7 Total Anticipated Energy Consumption

### 7.1 Residential

The annual energy consumption of the residential apartments has been predicted by the NatHERS analysis and is regulated by BASIX. The average area adjusted loads are summarised in the following table:

	Heating (MJ/m <sup>2</sup> pa)	Cooling (MJ/m <sup>2</sup> pa)	Total (MJ/m <sup>2</sup> pa)
<b>Predicted</b>	39.1	15.0	67.1
<b>BASIX Maximum</b>	40.0	26.0	-
<b>Status</b>	Complies	Complies	-

The BASIX energy score is 45 which is also the target.

## 8 Water Efficient Fixtures

### 8.1 General

The water efficiency of fixtures is detailed in the BASIX Certificate and summarised in the following table:

Fixture	Rating
Shower	4 star 4.5 to 6 L/min
Toilets	4 star
Taps	4 star
Dishwashers	4.5 star

All fixtures are low flow and thereby contribute to water efficiency.



## **9 Demand for Water & Discharge of Wastewater**

### **9.1 General**

The BASIX Certificate specifies a 20,000L central rainwater tank that captures at least 446 m<sup>2</sup> of roof and is used for the irrigation of landscape. When combined with the efficient fixtures (section 8 above), a BASIX water score of 40 is achieved which meets the BASIX target of 40.

## **10 Potential Treatment & Reuse of Effluent or Stormwater**

### **10.1 General**

The design includes the collection and use of rainwater (section 9 above), however treatment and reuse has not been included in the DA design.