# Home Co St Marys

## Energy Efficiency Report

**Prepared for: Home Consortium**

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**Date: 30 November 2020**

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**Ref: 301350092**

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# Revision

| Revision | Date | Comment | Prepared By | Approved By |
|---|---|---|---|---|
| 01 | 27/11/2020 | Draft – For Client Review | ALH | GB |
| 02 | 30/11/2020 | Issue for DA | ALH | GB |
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# Disclaimer

This report has been developed based on the Development level of information provided to Stantec. Stantec has taken every effort to ensure the information presented in this report is an accurate reflection of the development but cannot guarantee the final performance of the building. The content of the development, including systems, materiality and finishes is subject to final architectural and client approval and subject to change.

# Contents

# 1. Executive Summary

The Energy Efficiency Report has been prepared at the request of HomeCo and is intended to provide an overview of the ecologically sustainable design (ESD) principles and energy efficiency measures that will be implemented for the proposed HomeCo St Marys development located at 243 Forrester Rd, North St Marys, NSW 2760.

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers)
- Detail regarding the overall sustainability framework adopted for the site; and
- Detail regarding specific ecological design responses.

Information contained within this report has been prepared in direct response to:

- Penrith Council Local Environmental Plan 2010;
- Penrith Council Development Plan 2014;
- NCC 2019 Section J Compliance; and
- Industry best practice drivers for ecological sustainable design

In coordination with the above, the project will implement sustainable design principles and initiatives designed to achieve the following:

- Energy conservation and greenhouse gas emissions reduction, including targeting a 4.5 Star NABERS Energy for Shopping Centres rating;
- Water conservation and water reuse;
- Reduction of construction materials through the adaptive re-use of an existing building, resulting in significant reductions in the embodied carbon of the building;
- Indoor environmental quality of occupants;
- Waste minimisation and recycling; and
- Building commissioning and management practices to ensure building systems operate efficiently as designed.

# 2. Introduction

The project comprises a new retail development by HomeCo at 243 Forrester Rd, North St Marys. It involves the conversion of an existing large-plate building into a new retail development which includes the following:

- Medical centre,
- Childcare centre,
- Warehouse,
- Gym
- Dentist clinic,
- Imaging clinic,
- Physio clinic,
- Pet store and vet
- Nutrition and other retail shops
- On-grade car parking and loading dock

The development is spread across a 3.2-hectares with a west frontage to Forrester Road and adjoining the St Marys Rugby League Club and Stadium. The project site is shown in the image below.

**Figure 1 – Project Site Location (Ref: NSW ePlanning Spatial Viewer)**

# 3. Sustainable Design Framework

The proposed sustainability response for the project includes various associated drivers, including the following regulatory frameworks:

- Penrith Council Development Control Plan (2014);
- Penrith Council Local Environmental Plan (2010);
- NCC 2019 Section J Compliance; and
- Industry best practice drivers for ecological sustainable design

## 3.1 Regulatory Frameworks

### 3.1.1 Penrith Development Control Plan (DCP) 2014

The Penrith Development Control Plan 2014 has been prepared in accordance with Section 74C of the Environmental Planning and Assessment Act 1979 and clause 16 of the Environmental Planning and Assessment Regulation 2000.

Chapter ***C1 Site Planning and Design Principles*** of the Penrith Development Control Plan 2014 states:

***"1.2. Design Principles***
***B. Objectives***

*b) To ensure that development is designed on a 'whole of building' approach by:*
*ii. responding to climatic and contemporary environmental conditions by:*
- *encouraging passive solar building design;*
- *allowing reasonable daylight access to all developments and the public domain;*
- *reducing the necessity for, or improve the control of, mechanical heating and cooling;*
- *reducing the energy consumed by installed appliances and equipment;*
- *improving the indoor environmental quality of occupants;*
- *minimising greenhouse gas emissions;*

***1.2.1. Application of Certification System***

*a) Non-residential developments, including mixed-use developments, with a construction cost of $1 million or more are to demonstrate a commitment to achieving no less than 4 stars under Green Star or **4.5 stars under the Australian Building Greenhouse Rating system, now part of the National Australian Built Environment Rating System (NABERS).***

***1.2.2. Built Form – Energy Efficiency and Conservation***

*b) The selection criteria for construction materials, including internal fit-out work, should include detailed documentation of their energy efficiency properties.*
*c) Buildings should be designed on passive solar design principles which:*
*i. Respond to orientation to maximise the northerly aspect and solar access in the cooler periods;*
*ii. Reduce overheating in summer and promote solar gain in winter; and*
*iii. Ensure there is adequate cross flow of air by utilising natural ventilation, resulting in a reduction in the use of mechanical ventilation and/or air-conditioning systems.*
*d) The future use and occupants of the building should be considered in the design and location of building services/equipment to ensure that:*
*i. The thermal comfort of occupants is optimised through zoning sections of the floor area to*
*ii. of building services is provided enable individual control of heating and cooling;*
*iii. Lighting systems and fittings have reduced energy consumption that are also appropriate for the use/activity located in that part of the building;*
*iv. The equipment or service will be used and its future use will not affect other elements of sustainability; and*
*v. Sub-metering to individual tenancies within the development to enable individual monitoring of consumption performance.*
*e) Common and service areas in the building should incorporate energy and water efficiency/conservation measures in their design and location.*

Chapter ***C3 Water Management*** of the Penrith Development Control Plan 2014 states:

***C. Controls***

***3) Proposed Industrial Land Uses***

The following controls apply to new industrial buildings and significant alterations/additions to industrial buildings:

*b) All proposed industrial sites with a hard surface area (including roof area, driveways, parking areas, loading bays, covered storage areas, etc.) greater than 1,000m2 shall submit a water management plan which estimates required water needs, and includes an investigation into the feasibility of the measures listed below, outlines those to be adopted on the site and explains why any measures not adopted were unable to be implemented:*

*i. Rainwater tanks connected to roof and gutter systems and installed to enable reuse of rainwater for irrigation, industrial processes, toilet flushing or other non-drinking purposes;*

*ii. Stormwater detention systems installed and maintained to enable the reuse of stored water for irrigation, industrial processes, toilet flushing or other non-drinking purposes, and to minimise the impact of runoff from the site;*

*iii. Roof gardens, either for recreational purposes or as a means to reduce hard stand area.*

### 3.1.2 Penrith Local Environmental Plan (LEP) 2010

Part 7.4 of the Penrith Local Environmental Plan 2010 states:

***"Part 7 Additional local provisions***

***7.4 Sustainable development***

*In deciding whether to grant development consent for development, the consent authority must have regard to the principles of sustainable development as they relate to the development based on a "whole of building" approach by considering each of the following—*

*a) conserving energy and reducing carbon dioxide emissions,*
*b) embodied energy in materials and building processes,*
*c) building design and orientation,*
*d) passive solar design and day lighting,*
*e) natural ventilation,*
*f) energy efficiency and conservation,*
*g) water conservation and water reuse,*
*h) waste minimisation and recycling,*
*i) reduction of vehicle dependence,*
*j) potential for adaptive reuse."*

### 3.1.3 NCC 2019 Section J

Section J of the National Construction Code (NCC) 2019 stipulates the energy efficiency requirements for buildings. Compliance is demonstrated by meeting the minimum deemed-to-satisfy (DtS) requirements for building fabric and services, as stipulated in NCC 2019. In the context of this refurbishment project, only new building fabric elements will be subject to NCC 2019 Section J requirements.

# 4. Project Design Response

As per the Penrith Council planning stipulations, the development is committed to achieving a **minimum 4.5 Star NABERS Energy for Shopping centres rating.**

The project team has assessed the energy use profile of the development and will investigate the implementation a number of energy efficiency measures that will reduce significantly the greenhouse gas emissions and footprint of the project, including:

- On-site renewable energy production;
- Rainwater harvesting and reuse;
- Energy efficient lighting systems (internal and external) and lighting controls;
- Façade thermal performance for new elements in line with NCC 2019 Section J;
- Efficient HVAC system equipment;
- Explore opportunities to reduce embodied energy reduction associated to construction material selection;
- Increased access to natural daylight where possible;
- Water efficient fixtures and fittings (WELS ratings);
- Application of Water Sensitive Urban Design (WSUD) principles;
- Increased indoor environmental quality through the use of low-VOC paints, adhesives and sealants.

The development will give a strong consideration to potential environmental impacts by reducing it with the above best practice design initiatives. These initiatives are further explored in the following section.

# 5. Sustainability Strategy

There are several Ecological Sustainable Development opportunities and initiatives that will be implemented in the project. It uses best practice sustainable design principles and borrows elements from external sustainability tools to develop a set of metrics for the site.

General principles of ecologically sustainable development will be applied in order to achieve:

- Energy conservation and greenhouse gas emissions reduction;
- Water conservation and water reuse;
- Use of responsible building materials;
- Indoor environmental quality of occupants;
- Waste minimization and recycling;
- Best practice Building Management.

## 5.1 Energy Efficiency

A variety of energy efficiency measures can be applied to the proposed development and form part of its initial design and operational plan. The final strategy will be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The project is targeting a 4.5 Star NABERS Energy for Shopping Centres rating in operation, in accordance with Penrith Council DCP requirements. To achieve this, energy efficiency will be at the forefront of the building design.

The energy efficiency strategy follows the hierarchy shown in the figure below. Best practice energy conservation dictates that in the first instance demand is reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest impact and return on investment.

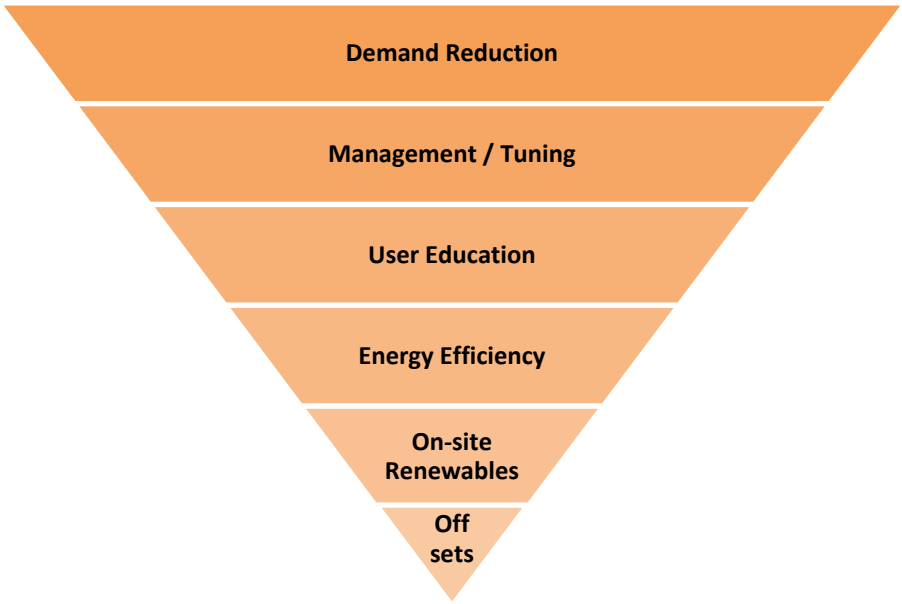


**Figure 2 - Energy Efficiency Strategy Hierarchy**

To reduce the total carbon footprint and GHG emissions associated with the development's construction and operation, the following energy efficiency measures will be investigated during further design development:

- **On-site Renewable Energy Production**

  On-site Renewable Energy Production will be implemented in the design to minimise utilisation of energy from the grid system. The system will be designed so that renewable energy is prioritised for use. Consideration can also be given to selling excess energy back into the grid or storage on site for peak reduction.

  Further feasibility will be completed regarding the ideal system configuration, sizing, annual energy generation, etc. It is noted the electricity consumption from the site is still to be estimated where the appropriate renewable energy contribution will depend on the final architectural design, industrial arrangement, building services design and tenants operational requirements.

- **Energy Efficient lighting systems (internal and external):**

  Energy Efficient lighting selection (LED lighting) and system can reduce the electrical load on the grid significantly for the same illuminance output in comparison to traditional incandescent lights. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials. As such, LED lighting will be utilised throughout the proposed development.

- **Controls of lighting systems:**

  This can include zoned switching, lighting control systems with time clocks and may include lighting sensors where appropriate. This will reduce base building energy consumption by ensuring artificial lighting is turned off when not required.

- **Façade Thermal Performance / Building Thermal Mass:**

  All new elements of the building envelope thermal performance to comply with NCC 2019 Section J requirements (conditioned spaces). This will reduce reliance on mechanical cooling and heating and therefore bringing down HVAC operational energy consumption.

  The roof material and colour will be reflective of solar radiation, and consideration will be given to building overall thermal mass and to application of thermal insulation appropriate to the local weather profile.

- **Solar Gain Reduction / Shadings:**

  External shading devices will be implemented in the architectural design adjacent to conditioned spaces in order to reduce solar exposure / solar gains thus reducing the reliance on mechanical systems for internal conditioning. Awnings will be provided at each access point to the warehouses.

  The building roof is designed to be light coloured (low solar absorptance), which also reduces solar gains by reflecting light and is beneficial to the local heat island effect.

- **Efficient HVAC System Equipment:**

  Efficient HVAC systems with high COPs will be appropriately designed and sized for the development.

## 5.2 Water Efficiency

A variety of water efficiency measures can be applied to the proposed development. These best practice water efficiency measures implemented to reduce water consumption include:

- **Water efficient fixtures, fittings, and appliances (WELS rating):**

  By implementing low-flow water fixtures, the consumption associated with amenities can be reduced. This includes taps, wash basins, WCs, Urinals, showers and supplementary water uses. Where applicable, priority will be given to water efficient appliances (i.e. dishwashers).

- **Rainwater harvesting and reuse:**

  A rainwater tank will be implemented as required. Further feasibility will be completed regarding the ideal tank sizing, capture area and end-use for any non-potable water collected. Rainwater on this site is particularly advantageous given the significant collection area across the building roofs. The captured water can offset irrigation water consumption, wash down and potentially toilet flushing.

- **Water use metering** which can identify leaks and amend losses before greater loss occurs.

### 5.2.1 Water Sensitive Urban Design (WSUD)

The WSUD principles outlined in Chapter C3 Water Management - Water Sensitive Urban Design - of the Penrith DCP will be considered for implementation by the project. These include:

- To maintain the natural water balance;
- To make more efficient use of water resources by conserving water, particularly potable (drinking) water;
- To reduce general flood risk;
- To reduce erosion of waterways, slopes and banks;
- To control stormwater and waste water pollution and improve water quality in waterways and groundwater;
- To integrate stormwater management with water supply and waste water treatment; and
- To integrate stormwater treatment into the landscape so as to maximise the visual and recreational amenity of urban development.

## 5.3 Responsible Building Materials

Construction materials are a highly carbon intensive component of any development. They often involve energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development. However, there are a number of environmentally friendly practices starting to become accepted by the construction industry.

- **Building Reuse:**

  Where possible, any existing building material will be maintained or reused to conserve water and energy. The main structure of the building will be retained, as a result of this, the project team believe the embodied energy of the building materials is reduced by 70-80%.

- **Embodied Energy reduction associated to construction material selection.**

  Depending on the materials selected for the constructions, and the options available in the area, use of low embodied energy and water materials with preference for sourcing from local or sustainable materials suppliers will be adopted – where possible – during material selection and pre-construction process. This can also include materials with high recycled content.

## 5.4 Indoor Environmental Quality

Indoor Environment Quality (IEQ) has been defined as a key sustainable building category in order to improve indoor environments for building occupants which in turn aims to improve their overall wellbeing. Consideration to improving indoor environmental quality will be a vital step within the development's design process for any modern building. Therefore, provision of more thermally comfortable spaces for occupants and allowance to natural daylight will be envisaged.

The proposed development seeks to improve the overall IEQ for building occupants by addressing the following elements:

- The use of skylights will be investigated during design development with the intent to achieve **natural daylight** while maintaining a high thermal performance
- Glazing will be selected to maximise access to daylight while prioritising thermal performance necessary to achieve the targeted energy consumption outcomes.
- **Low Volatile Organic Compounds** (VOC) internally applied paints, carpets, adhesives and sealants will be selected for the project.
- **Low Formaldehyde** engineered wood products (particleboard, plywood, MDF) will be selected for the project.
- **Best Practice PVC** to be specified and sourced

## 5.5 Waste Management

To facilitate sustainable waste management within the City of Penrith in accordance with the principles of Ecologically Sustainable Development, waste minimisation and resource recovery, easy access to waste systems, pollution prevention associated with waste management practices will be taken into consideration as part of waste management strategy.

The development aims to increase on-site recycling and resource optimisation through adoption of the Waste Management Hierarchy with the ultimate goal of reducing waste going to landfill, in line with the *The Waste Avoidance and Resource Recovery Act, 2001* and the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*. The figure below shows the Waste Management Hierarchy:

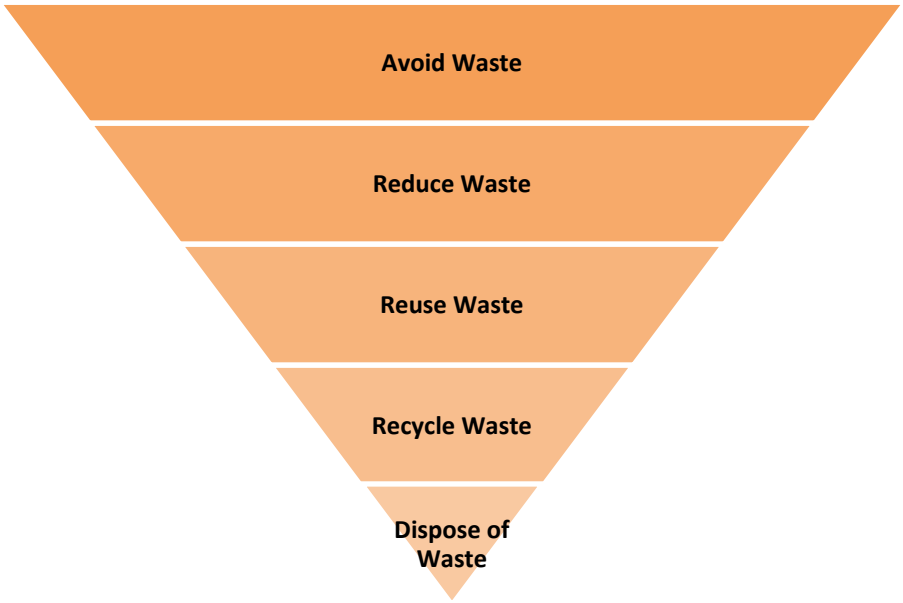


**Figure 3 - The "Waste Hierarchy"**

The key objectives for the management of waste will include:

- Minimise waste generation on site;
- Segregate waste on site to maximise recycling;
- Store waste on site appropriately to prevent cross-contamination and/or mixing of different waste;
- Segregate hazardous waste for appropriate treatment and disposal, where applicable;
- Where appropriate, set targets for demolition and construction waste diversion from landfill;
- Where appropriate, analyse potential operational waste generation profile from the warehouses and propose best practice Waste Management Strategies.

## 5.6 Building Management

In line with industry recognised best practice frameworks, the project design and built form will seek to respond to the ongoing environmental challenges of urban development and ensure the project implements a range of ESD initiatives aimed at improving ongoing building management.

Through specific contractual commitments and documented design intent the project proposes to address environmental management & building operational performance through the following initiatives.

- **Building Commissioning Procedures:**

  Prior to practical completion. By implementing this via project contract documents the project ensures operational efficiency & building operation is optimised in accordance with the intended building design.

- **Metering:**

  Metering substantial uses of energy and water will provide relevant data for the use & management of building staff. This will provide detailed information about the project energy use and profile on a regular basis and through an easily accessible online platform. This information will help in the understanding of the usage profile so that adjustments can be made to guarantee optimal performance. This ensures operational efficiency is maintained and also facilitates detection of systems failures, thus improving maintenance and tuning processes.

- **Waste provisions:**

  Appropriate waste provisions are going to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.

# 6. Summary of Design Response

Ecologically Sustainable Design continues to be a driving consideration in the HomeCo St Marys development. The project will incorporate a number of ESD initiatives to reduce the greenhouse gas emissions, potable water consumption and material resources of the site. These constitute the sustainability response from the project to the site applicable sustainable design frameworks, as listed within Section 3. Sustainable Design Framework.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of categories including:

- Energy conservation and greenhouse gas emissions reduction, including targeting a 4.5 Star NABERS Energy for Shopping Centres rating;
- Water conservation and water reuse;
- Reduction of construction materials through the adaptive re-use of an existing building, resulting in significant reductions in the embodied carbon of the building;
- Indoor environmental quality of occupants;
- Waste minimisation and recycling; and
- Building commissioning and management practices to ensure building systems operate efficiently as designed.

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and greenhouse gas and energy efficiency vision for the HomeCo St Marys development.

Design with
community in mind

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