Snack Brands Food Manufacturing

ESD Report

SEARS Ecologically Sustainable Design Report

Prepared for: TMX

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Disclaimer

Energy modelling provides an estimate of a building's energy performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all of the intricacies of the building and its operation. As a result, energy modelling results only represent an interpretation of the potential performance of a building. No guarantee or warrantee of building performance in practice can be based on energy modelling results alone.

The results generated from any modelling analysis within this report are based on specific criteria outlined in the National Construction Code (NCC) along with best practice guidelines and are not considered to be a true representation of the actual operation of the building. The intent of these criteria is to permit the project team to estimate the expected annual energy consumption of the proposed building and therefore determine if the building has the ability to be energy efficient.

1. Executive Summary

This report has been prepared by Stantec at the request of TMX and is intended to provide an overview of the Ecologically Sustainable Design (ESD) initiatives for the proposed Snack Brands Food Manufacturing facility located at 14 Distribution Drive, Orchard Hills.

This report is intended to provide an overview of the potential key energy uses on site, and review methods to reduce the overall energy consumption. This is a design response to the Secretary's Environmental Assessment Requirements (SEARs) for the project. The report further addresses ecologically sustainable aspects included in the development.

The report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers)
- An assessment of the energy use on site and proposed measures to ensure energy efficiency
- Detail regarding specific ecologically sustainable development (ESD) initiatives through all phases of the project.
- Heat island effect mitigation strategy through the use of cool roofs in the design of the development.
- An overview of ESD strategies to be implemented to minimise consumption of resources including energy and water.

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

- Relevant State & Local Government Controls;
- The Request for Secretary's Environmental Assessment Requirements (SEARs); and
- Industry recognised best practice in sustainability

In coordination with the above, the project has chosen to implement a number of sustainable design principles and includes initiatives design to mitigate the environmental impact of the following:

- **Energy** – including improved energy efficiency across the buildings and its associated sources.
- **Passive Design Principles** – reducing the projects overall requirement for building services.
- **Water Efficiency** – including reduced potable water demand.
- **Waste Management** – including the incorporation of a waste treatment plant
- **Ecology** – Maintaining ecology through landscaping where practical

The following sections detail the development's specific sustainable design response in more detail.

2. Introduction

2.1 Project Overview

The proposed development is a Food Manufacturing facility to be developed for Snack Brands Australia (SBA). SBA proposed to develop a food manufacturing facility with an associated office space and car parking at 14 Distribution Drive, Orchard Hills. The facility will be located adjacent to a distribution centre also operated by SBA.

Currently, SBA manufactures its food products in two facilities located in Blacktown and Smithfield prior to being transported to the distribution centre. The proposed facility is intended to consolidate the operations of the two existing facilities into one facility in Orchard Hills.

The food products anticipated to be manufactured at the Proposal site would primarily comprise potato and corn products such as deep-fried chips and is proposed to be operational 24 hours a day, seven days a week. The total area of new buildings at the proposal site is expected to occupy a total area of 24,572 m^2. Specifically, the Proposal is anticipated to comprise:

- 19,582 m^2 of new purpose-built industrial food manufacturing facility,
- 2,485 m^2 of ancillary Office area
- 2,155 m^2 Waste Treatment Plant
- 160 new car parking spaces

The food manufacturing activities at the Proposal site will operate process lines for the processing and packing of potato and corn products and is anticipated to include:

- Receival of raw materials (i.e. potatoes and corn);
- Storage and handling raw materials;
- Processing raw materials such as peeling and slicing;
- Cooking food products:
  - Potatoes will be cooked in an oil fryer;
  - Corn will be cooked in an oil fryer and dried in an oven;
- Packaging and distributing the final product;
- Accumulating, storing, and disposing of food wastes and food-preparation wastes; and,
- Onsite wastewater treatment.

2.2 Project Site

Figure 1 Site Aerial Photo - Source: Willow Tree Planning - Planning Scoping report

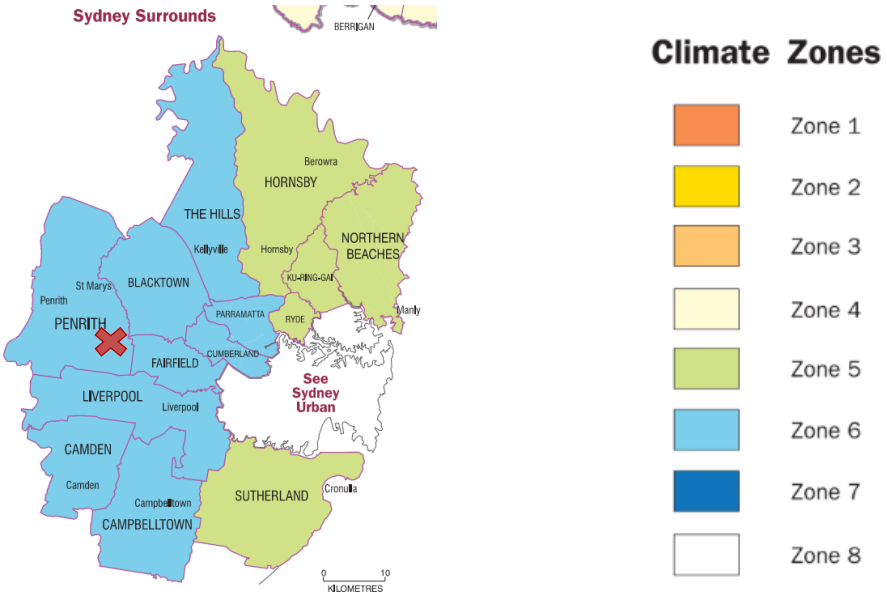


Figure 2 Climate Zone Map and Location of Development (abcb.gov.au)

Property Title	Snack Brands Food Manufacturing Facility
Address	14 Distribution Drive, Orchard Hills, NSW
Number of storeys	1 + Office mezzanine
Building Description	Food Manufacturing Facility and Office
ABCB Climate Zone	Zone 6
Building Class	Class 7 (Food manufacturing facility) and Class 5 (office)

3. Summary of Sustainability Commitments

3.1 Sustainability Vision

In pursuit of the ecological design principles, the development located at 14 Distribution Drive, Orchard Hills will pursue excellence benchmarked from a number of sources. These include best practice design initiatives from:

- Mamre West Precinct Investigation Area DCP, February 2016
- Penrith City Council Local Environmental Plan (LEP) 2010,
- Secretary's Environmental Assessment Requirements (SEARs) for this development

3.1.1 Secretary's Environmental Assessment Requirements (SEARs)

The SEARs document outlines requirements for this development that must be addressed as part of the Environmental Impact Statement. These are:

- **Ecologically Sustainable Development**. Including
  - a description of how the proposal will incorporate the principles of ecologically sustainable development in the design, construction, and ongoing operation of the development
  - consideration of the use of green walls, green roofs and/or cool roofs in the design of the development
  - a description of the measures to be implemented to minimise consumption of resources, especially energy and water.

This report directly addresses these key issues in the SEARs requirements for the site, issued by The Department of Planning and Environment (DPE). This report is intended to form part of the Environmental Impact Statement (EIS) for the SSD-18204994.

3.1.2 Mamre West Precinct Investigation Area DCP

The Mamre West Precinct has a specific DCP developed in February 2016. The ESD elements associated with this report are replicated below:

6.4 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Objectives:

- *To encourage development that incorporates measures to minimise potential energy use*
- *To include water minimisation initiatives within the proposed subdivision and development of the site*

Controls:

- *Development is to include sustainable building technologies and materials and use energy efficient fixtures within the building fit-out.*
- *Water saving devices and techniques are to be included within the design and fit-out of industrial buildings, including rainwater harvesting, dual flush toilets, use of non-potable water for irrigation and the like.*

These controls are specifically addressed in this development, with a number of the elements outlined in this report.

4. Greenhouse Gas Emissions & Energy Efficiency

An analysis has been performed regarding the Greenhouse Gas Emissions of the site for both the office areas and the Food manufacturing facility. This has been performed by performing an energy model for both the office and the food manufacturing facility to investigate the effects of differing designs. The results presented herein are intended to influence the architecture in finalising the design and operation of the spaces.

4.1 Building Design

The building has been analysed for a number of different design elements and configurations. These include:

- High performance glazing in office and lobby area
- Light roof colour with lower solar absorptance
- Wider temperature control band in office area
- Increased lighting efficiency

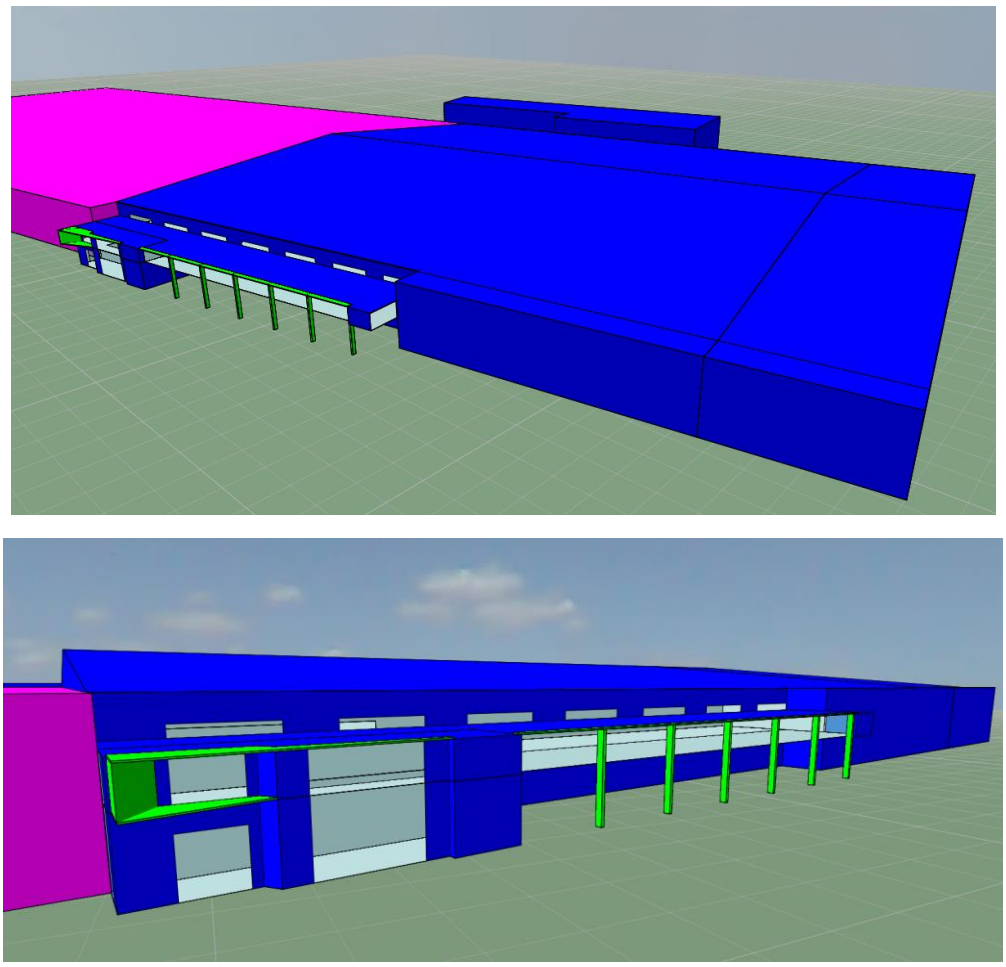


Figure 3: Building Energy Model from IES VE 2019 Software

4.2 Methodology and Inputs

The NCC 2019 Section JV3 Part J1 DTS provisions have been used as a benchmark to build a base case model in order to quantify the proposed ESD initiatives improvement on the energy performance of the building.

The proposed model has been built according to the project's requirements including the ESD strategies such as an improved building envelope. A comparative analysis on the energy and GHG emission results demonstrates the improvements. Note: This report is not a formal NCC 2019 Section J analysis

The base case building has been constructed to describe a typical **class 5** (office) and **class 7** (Food manufacturing facility) construction that meet the NCC 2019 DTS minimum requirements in **climate zone 6**. Temperature control within the Food manufacturing facility was model in accordance with SBA requirements. Refer to Appendix A for details.

The models were based on the relevant design drawings documented by HL Architects (HLA) as nominated below:

- Site Plan (Overall) – Drawing Number 210216-AR-A001 – HL Architects (HLA) – 16/07/21 [P18]
- L1 Mezzanine Plan – Drawing Number: 210216-AR-A101 – HL Architects (HLA) – 16/07/21 [P7]
- Warehouse Section – Sheet 1 – Drawing Number: 210216-AR-A210 – HL Architects (HLA) – 16/07/21 [P11]
- Warehouse Section – Sheet 2 – Drawing Number: 210216-AR-A211 – HL Architects (HLA) – 16/07/21 [P7]
- Revit File - 210406_Snack Brand – HL Architects (HLA) – 26/03/2021

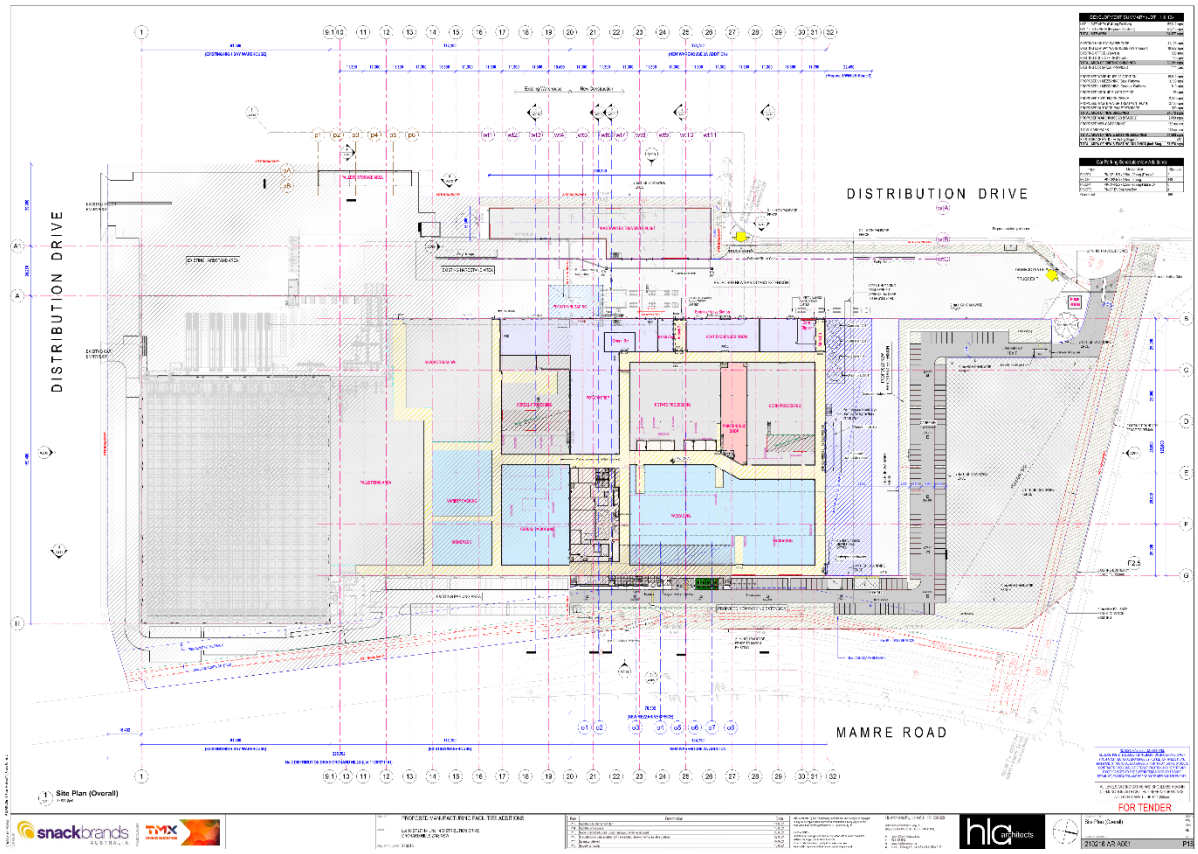


Figure 4: Site Plan (Overall) - Source: SBA

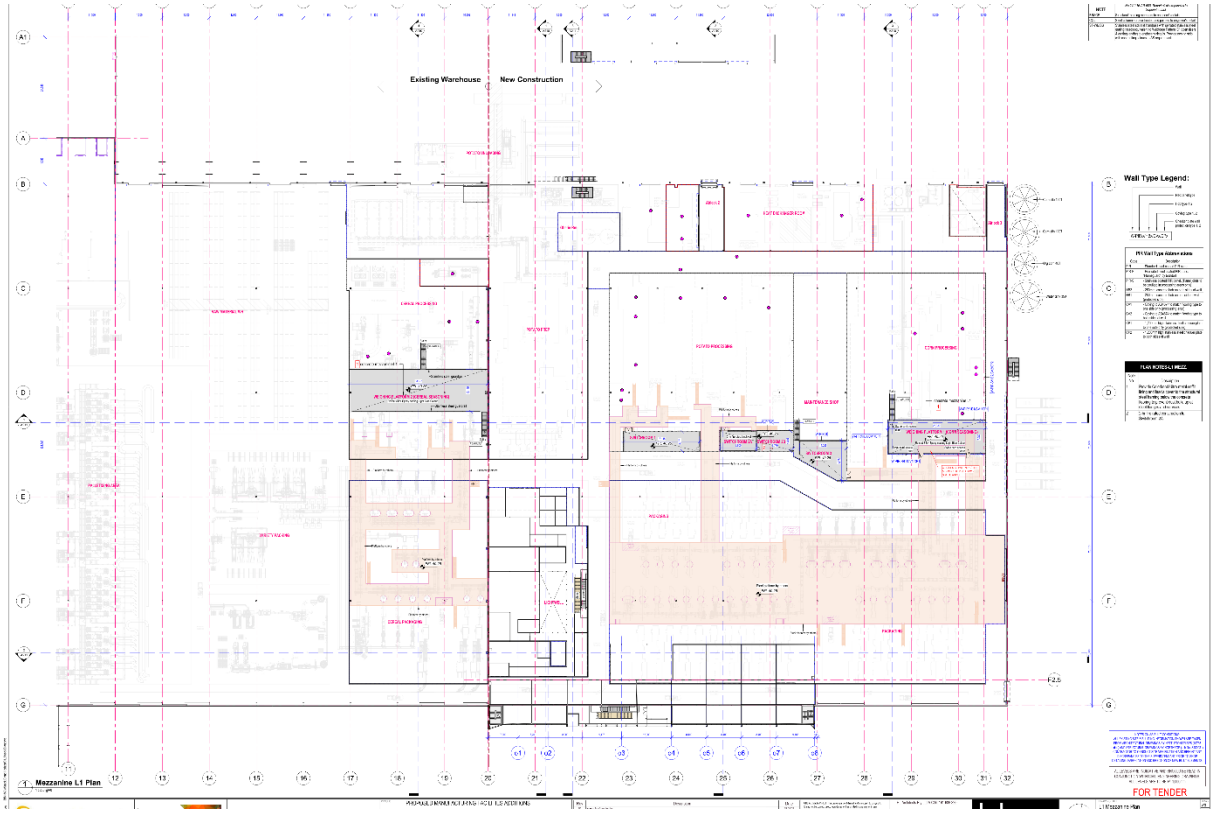


Figure 5: L1 Mezzanine Plan - Source: SBA

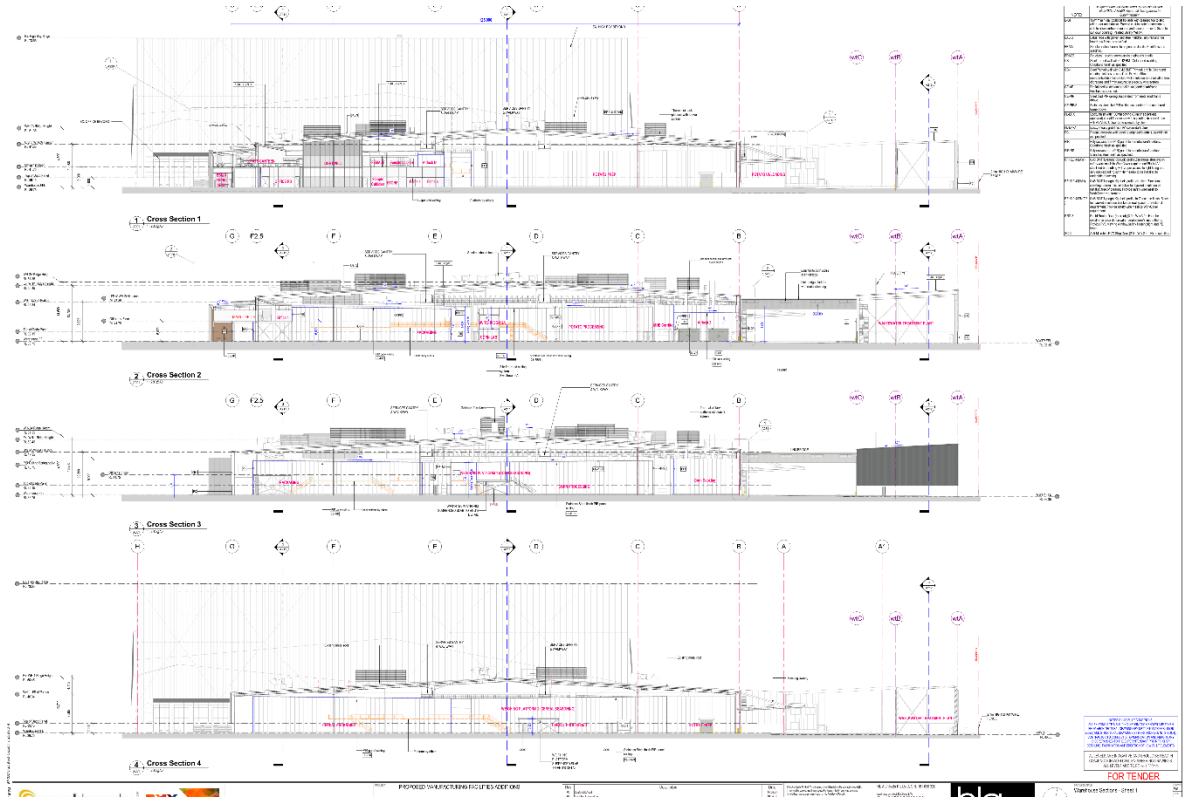


Figure 6: Sections Sheet 1 - Source: SBA

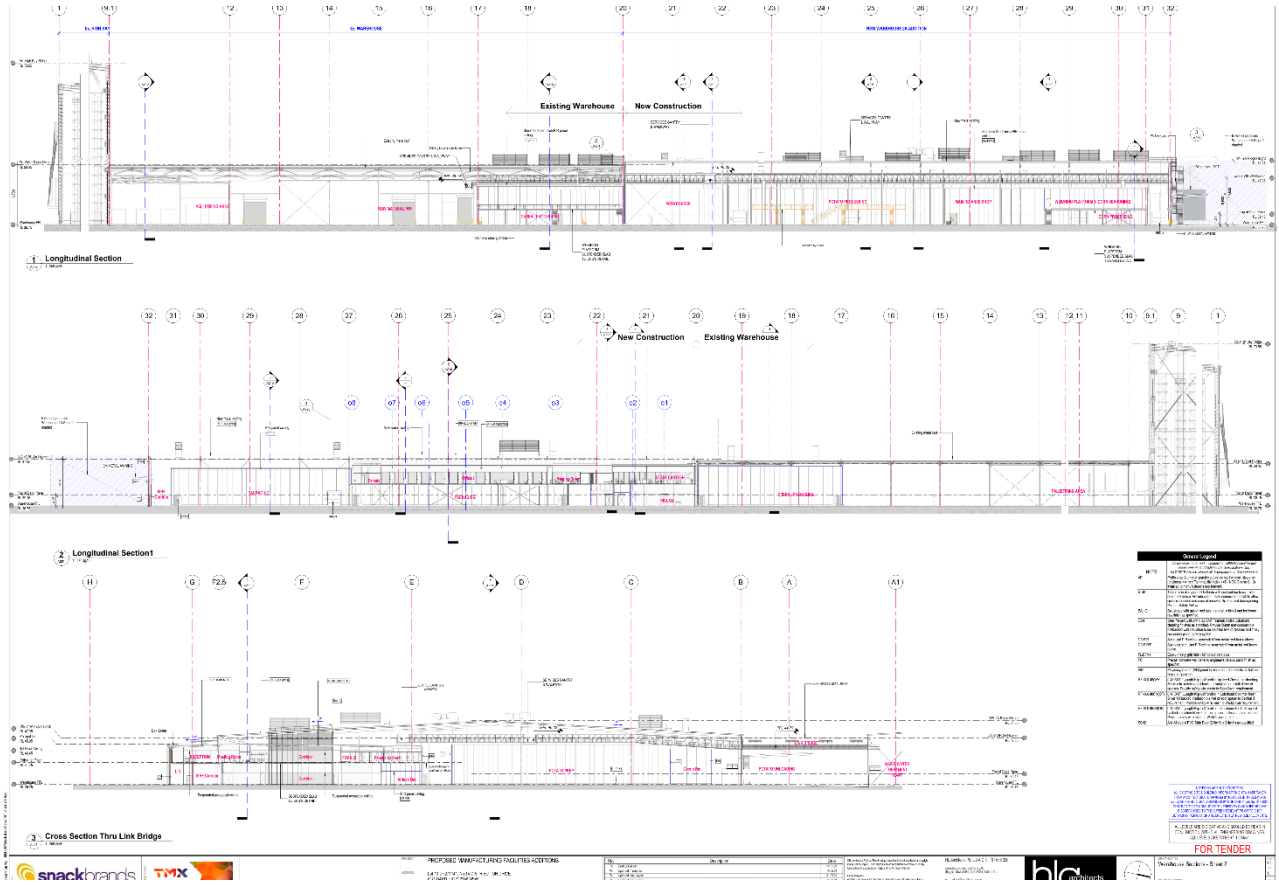


Figure 7: Sections Sheet 2 - Source: SBA

4.3 Description of Inputs

A number of models have been developed to explore the effects of altering certain design elements that could improve the building's energy efficiency and overall sustainable outcome. The following changes were applied to the Reference model based on the project's ESD strategy:

1. **High performance glazing in office and lobby area**

   All windows: U value: 2.5 | SHGC: 0.35

2. **Light roof colour with lower solar absorptance**

   R_T 3.2 (heat flow downwards) | Solar Absorptance: 0.32 (Colorbond 'Windspray')

3. **Wider temperature control band in Office area**

   Increasing the temperature control band from 21-24°C to 19-26°C

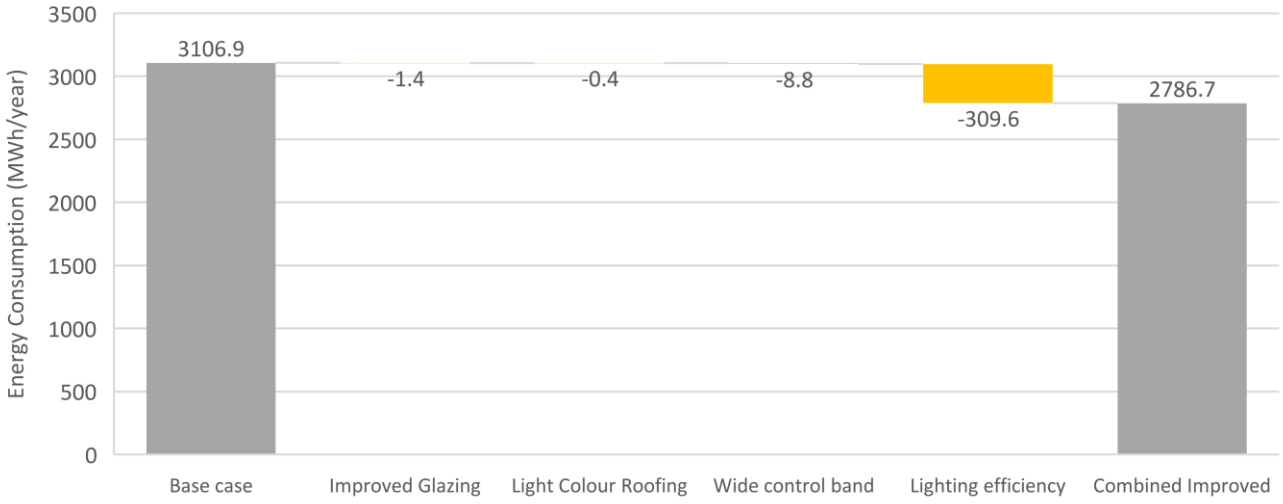
4. **Increased lighting efficiency**

   Incorporation of high-efficiency lighting (10% improvement upon NCC 2019)

4.4 Results

The following table show the cumulative savings and improvements achieved in the proposed development through the incorporation of ESD strategies.

Case	Energy Consumption (MWh/yr)	GHG emissions (kgCO2e/yr)	Cumulative % improvement on reference
Base Case	3106.9	2958.9	-
+ Improved Glazing Performance	3105.5	2957.6	0.05%
+ Light Colour Roofing	3105.1	2957.2	0.1%
+ Wide temperature control band (office)	3096.3	2948.8	0.3%
+ Increased Lighting efficiency	2786.7	2654.0	10.3%



Combining all the above strategies reduces the energy consumption of the building from the base case by 10.3%.

The Food manufacturing facility represents 90% of the building area, most of which is unconditioned. Given the 24/7hs operation of the facility, the lighting and equipment loads are considerable. The use of highly efficient lighting fixtures shows a significant improvement in the energy use of the building.

In the office area however, the cooling loads are responsible for most of the energy use. Therefore, the incorporation of solar control double glazing and a light-coloured roofing are key to reduce internal heat gains and bring the cooling loads down and improve the occupant's thermal comfort.

There are a number of improvements that can be incorporated to the building to further reduce loads including the following:

- Incorporation of motion and occupancy sensors for lighting in office and food manufacturing facility,
- Inclusion of Solar PV on the roof area,
- Use of energy efficient equipment, and
- Incorporating solar control devices (i.e. blinds) to the office North and East façade to reduce discomfort glare and excessive heat gains at peak hours.

5. ESD Opportunities & Initiatives

The following section identifies Ecological Sustainable Development opportunities and initiatives for potential inclusion within the project.

5.1 Design Overview

Fundamental to the success of improving the ESD outcome for the project is the adoption of strong design philosophy. Passive thermal design features have the ability to:

- Improve building occupant comfort;
- Lower operational energy demand via improved thermal performance;
- Promote greater indoor environmental quality;
- Reduce the requirements for artificial lighting & power;
- Reduce the buildings' reliance on HVAC systems; and
- Improve the project's ability to deliver a responsible development.

The design will attempt to include several passive design options and provide a robust and environmentally sensitive framework.

5.2 Penrith Council DCP Requirements

The following Ecologically Sustainable initiatives will be included in the design, to align with the controls and objectives of the Penrith DCP 2014 & Mamre West Precinct Investigation Area DCP 2016.

- **Access:** Pedestrian footpaths will be available at street level, encouraging a walkable site and alternative transport options.
- **Shade:** Awnings will be provided at each access point to the food manufacturing facility. This will be provided on the warehouse edge where trucks load/unload to provide sun protection for employees.
- **Vegetation:** The landscaping of the site will include the planting of new trees in the setback region around the site boundary.

5.3 Environmental & Building Management

Via the implementation of industry recognized 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.

The project will seek to address environmental management & building operational performance through consideration of the following initiatives.

- **Building Commissioning & Tuning Procedures** – (prior to practical completion / 12 months post 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.
- **Energy Metering** – Energy meters will be installed separately for office, warehouse, and manufacturing areas (not shared). Sub-metering will provide real-time data for the use & management of building staff. Ensures operational efficiency is maintained in each are independently.
- **Lighting sensors** – The incorporation of lighting controls such as occupancy sensors and timers will ensure an efficient use of lighting energy.

- **Waste provisions –** The new development includes the construction of a Waste Treatment plant. The inclusion of this facility will allow SBA to achieve the design aim of eliminating/ minimizing waste through the following:
    - Minimising transport distances (materials to line, line end to end)
    - Segregating waste streams for ease of separation of recyclable and non-recyclable waste and to identify key areas of loss
- **Emissions controls** – Oil, odours, and particulates from the fryer exhausts are removed through efficient heat exchangers (HX). A thermal oil system is set in place to use heat efficiently throughout the food manufacturing process. In addition, HX have been insulated to avoid undesired heat transfers into the space, improving thermal and acoustic comfort.

5.4 Indoor Environmental Quality (IEQ)

Improved indoor environment quality is a significant by-product of sustainable building design. The architectural design by HL Architects (HLA) will give significant consideration to the incorporation elements within the project intent to improve indoor environment quality.

The following design features are considered with the intent to improve indoor environmental quality.

- Office floor plate design and layout has focused on **maximizing daylight access**. By maximizing daylighting opportunities, the building will inherently lower energy demand and GHG emissions via reduced lighting demand & improved passive thermal performance. This also increases occupant connection to the space. This is achieved by significant glazed areas, meeting rooms/cores being located away from the façade and the choice of glazing.
- Great proportion of **high-quality views**. The shape of the office is such that there are uninterrupted views from the majority of the open floor plates. This is also achieved by the extent of the glazed component of the building.
- **Glare and radiant temperature control** through the use of operable blinds on each window.
- **Artificial Lighting Design –** will be zoned & designed appropriately to ensure the optimum lighting comfort is achieved. This includes general illuminance and glare reduction in accordance with best practice standards, optimised surface illuminance for building users and localised occupant lighting controls.
- **Acoustic comfort –** consideration of internal noise levels, reverberation levels and appropriate acoustic separation levels in accordance with best practice standards. Examples include optimised internal materials and finishes to reduce reverberation improved building facades in order to ensure appropriate acoustic separation is achieved.
- **Material Selections –** will focus on reducing volatile organic compounds (VOC) levels and minimise formaldehyde impacts. Paints, sealants, adhesives, carpets, floor and material finishes will endeavor to comply with best practice VOC criteria via the architectural specification and design intent.

5.5 Potable Water Reduction

Reduced potable water demand is a key ESD initiative identified within industry best practice standards. The development will reduce potable water demand via consideration of the following initiatives.

- **Wastewater treatment** – an on-site wastewater treatment plant will collect and treat wastewater from the food manufacturing process. This will allow significant re-use of water to minimize potable water consumption for the development. The design of this facility will be developed during further stages of the project.
- **Utility meters** to be designed to meet metering guidelines under the weights and measurement legislation, as outlined under the current National Measurement Regulations.

- An automatic monitoring system which records both consumption and demand, capable of producing quarter hour, hourly, daily, monthly, and annual use for all meters.
- **Sanitary Fixtures -** All sanitary fixtures are to be provided to the WELS ratings identified below:
    - Taps – 6 Star WELS
    - Urinals – 6 Star WELS
    - Toilet – 4 Star WELS
    - Showers – 3 Star WELS (>6 but <=7.5)
    - Dishwashers (where included) – minimum 3.5 Star WELS

5.6 Heat Island Effect

In response to the growing heat island effect problem in Western Sydney, the proposed development will seek to incorporate a cool roof to help reduce heat build-up in the precinct. Cool roofs contribute to cooler and healthier environments, better air quality, climate change mitigation and lower energy consumption.

By installing a light-coloured roof with reduced solar absorptance the building will reduce energy loads by 0.1% (Refer to Section 4.4). In addition, it will help mitigate heat island effect within the Mamre West Precinct.

6. Summary

The development located at 14 Distribution Drive, Orchard Hills will incorporate a number of ecologically sustainable initiatives to complement the initiatives undertaken to reduce the Greenhouse Gas emissions of the site. These have been developed around a response to the Secretary's Environmental Assessment Requirements by Department of Planning and Environment.

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 & Greenhouse Gas Emissions
- Potable water reduction
- Minimising waste to landfill
- Indoor Environmental Quality
- Land Use & Ecology
- Emissions and Building Management

We trust this report provides sufficient overview of the Snack Brands Australia Food Manufacturing Facility commitment to environmentally sustainable design and the sustainability vision for the development.

Appendix A Reference Inputs and Façade Calculator NCC 2019

The building has a reference model that begins with the following baseline assumptions. These have been chosen to Building Fabric

Table 1 Reference Building Fabric DTS Requirements

Building Element	Minimum Total R-value* thermal performance requirement
Roof	**R_T 3.2 (heat flow downwards) | Solar Absorptance: 0.45**
External Walls	• where the wall is less than 80% of the area of the wall-glazing construction, **R_T 1.0** • where the wall is 80% or more of the area of the wall-glazing construction, **R_T 1.4** • Internal partitions adjacent to unconditioned spaces **R_T 1.4** • Solar Absorptance: **0.6**
Slab on ground	**2**
External Windows (Office only)	**As per glazing calculator – See Appendix A**

6.1.1 Internal Loads

Profiles

Occupancy, lighting, equipment and HVAC plant throughout the site were estimated to operate in accordance with the NCC2019 Volume One Specification JV(c) Modelling profiles except for the Food manufacturing facility area that according to the planning scope seeks to operate 24 hours per day, seven (7) days per week.

Lighting Levels

The lighting load allowances incorporated into the energy model were as per allowances within NCC 2019 Volume One Section J, Table J6.2a.

Zone	Lighting Load (W/m^2)
Office	4.5
Food manufacturing facility	6

Occupant Density & Heat Gains

The occupant densities applied to the model are accordance with the requirements stipulated in the NCC Volume One Section D, Part D1, Table D1.13.

Zone	Occupant Density (m^2/person)
Office	10
Food manufacturing facility	10

Appliances and Equipment

The allowances for sensible and latent heat gain from equipment to all heating and cooling zones throughout the site as per the requirements stipulated in NCC Volume One Section J, Specification JVc, Table 2I.

Zone	Sensible (W/m^2)
Office	5
Food manufacturing facility	15

6.1.2 Building Services

Temperature control will be limited to the Office spaces and the Packaging and Seasoning chambers within the Food Manufacturing facility.

The following attributes for the HVAC system are in accordance with the Deemed-to-Satisfy requirements in the NCC 2019 Volume One Specification J5.11Unitary air-conditioning equipment, where variable refrigerant flow systems must comply with MEPS.

Cooling COP: 2.9

Heating Efficiency: 2.9

Cooling Fuel: Electricity

Heating Fuel: Electricity

Air Supply System: Zoned supply system with remote fan

In accordance with Specification JVb Clause 2 (c) (i) the space temperature of the Reference Building is within the range of 21°C DB to 24°C for 98% of the plant operation time.

Space Temperature Range

Space	Cooling Load Set-point (°C)	Heating Load Set-point (°C)
Office	24	21
Packaging chamber	25	10
Seasoning chamber	25	-

Mechanical Ventilation Rate – Outside Air

Mechanical ventilation has been modelled at the rates of introduction of outside air as per the design requirements stipulated in AS 1668.2.

Infiltration Air Change Rate

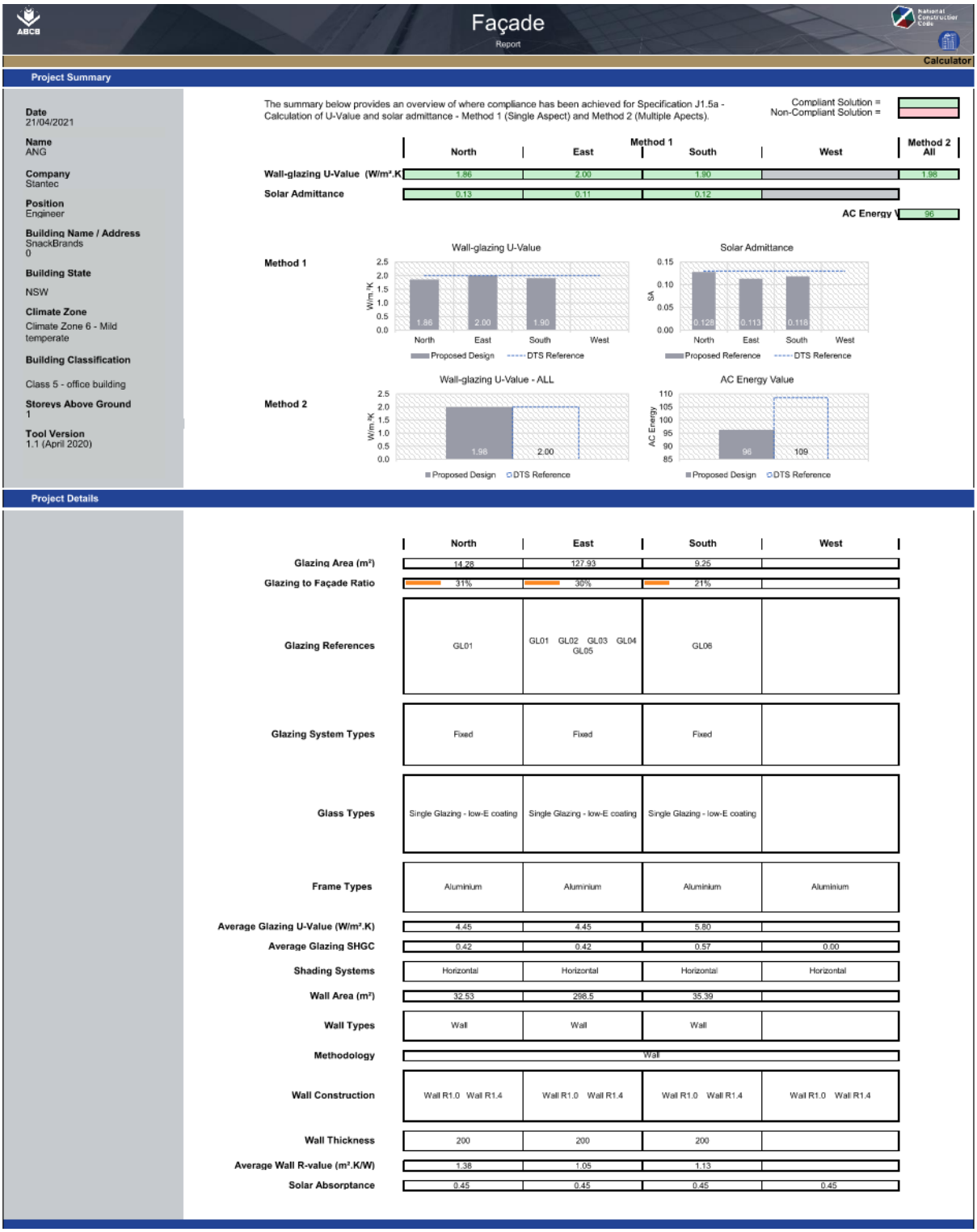
Infiltration air change rates have been modelled in accordance with NCC 2019 Volume One Specification JVb Clause 2 (d) as follows:

- (i) 0.7 air changes per hour throughout all zones when there is no mechanically supplied outdoor air; and
- (ii) 0.35 air changes per hour at all other times.

Domestic Hot Water

The energy usage of the heated water supply for food preparation and sanitary purposes is being considered the same in the proposed building and the reference building, and therefore is being omitted from the Section J assessment, in accordance with the NCC 2019 Volume One Specification JVb 4. (h).

6.1.3 NCC 2019 – Façade calculator



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