Ecologically Sustainable Design Assessment

142-150 Narrow Neck Road, Katoomba

Management 7bbh

C/- Antoniades Architects Pty Ltd
Suite 305, Level 3, 19A Boundary St
Darlinghurst, NSW 2010

Prepared by:

SLR Consulting Australia

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Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
2.0	16 January 2026	Anthony Marklund	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
2.0	5 November 2025	Anthony Marklund	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Management 7bbh (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Executive Summary

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Management 7bbh to provide a qualitative Ecologically Sustainable Design (ESD) assessment for the proposed mixed-use development (comprising Blocks A, B, C, D, E, F, G & H) located at 142-150 Narrow Neck Road, Katoomba.

This report forms part of the HDA for the project site.

This assessment has been based on the DA Drawings, issued December 2025

The proposal consists of:

- 8 residential buildings (4-storeys each), including;
    - 52 Serviced apartments
    - A restaurant and communal spaces
    - 218 residential units

The development includes many ecologically sustainable design features. This report provides an overview of these features.

The following ESD and energy efficiency features are proposed to be included in the design:

- The proposed development will incorporate passive and active energy-saving measures such as operable windows to enhance natural ventilation through the apartments, where appropriate;
    - 61% of the proposed residential units are naturally cross-ventilated.
- The form dictated by the site has been designed to maximise the solar access of residential units;
    - 62.4% (136 out of 218) of apartments will achieve 3 hours solar access across the assessment window.
    - 3% (7 out of 218) of apartments will receive no solar access across the assessment window.
- Thermal mass - Concrete slab construction is proposed for all floors throughout the development - concrete has amongst the highest thermal mass capacity of a range of common building products. The proposed development's external walls, structural internal walls, and slabs should be predominantly high thermal mass materials.
- LED energy-efficient lighting for all spaces;
- Centralised energy-efficient gas instantaneous hot water system;
- Individual 1-phase air-conditioning system for all living areas and bedrooms in the dwelling units with 4 star rating for heating and 3 star rating for cooling requirements;
- For non-residential spaces, high efficiency air conditioning system complying with Section J requirements is recommended;
- Dishwasher units to be installed within each residential dwelling. The dishwasher units are to have an energy efficiency rating of at least 3 stars;
- Clothes dryer units to be installed within each residential dwelling. The clothes dryer units are to have an energy efficiency rating of at least 3.5 stars;
- Provision of gas cooktop and electric oven;

- Water efficient bathroom and kitchen fittings;
  - All residential kitchen and bathroom taps are 4 star;
  - All shower heads are 4.0 star (>4.5 but <=6 L/min);
  - All residential toilet flushing systems are 4 star;
  - All residential dishwashers are 2 star;
  - All common area toilet flushing systems are 4 star;
  - All common area taps are 4 star.
- Light efficiency measures in the lobby using time clock and motion sensors;
- Low levels of volatile organic compounds (VOC) paints and floor coverings and low formaldehyde wood products where possible;
- Landscaped areas are within the residential development throughout the designated communal areas. Proposed planting provides added cooling during the summer months through the leaf transpiration process and is also useful for wind amelioration;
- Plant species within the development would be predominantly indigenous species that can tolerate low water to reduce maintenance requirements; and
- SLR recommends the installation of a solar PV system.
  - A 40 kW PV solar system is recommended to minimise greenhouse gas emission.
  - A 40 kW PV solar system will offset approximately 57.4 MWh/year of energy usage.
  - The estimated greenhouse gas CO2 emission saving is approximately 38.4 t.CO2/annum.
- The proposed residential development will enjoy a high level of thermal comfort gaining an average 7 NatHERS star rating.
- The development also meets BASIX targets in Water (Target 40) and in Energy (Target 45).

The report body contains recommendations regarding other ESD features, such as a mechanical ventilation system, domestic hot water, other appliances, and operational waste. These features will help achieve significant reductions in energy and water required by the development both in building and operation, in addition to ensuring that the residential units are pleasant spaces to reside.

It is recommended that the proposed ESD initiatives continue to be developed and implemented throughout this project.

Table of Contents

Tables in Text

Figures in Text

1.0 Introduction

SLR Consulting Pty Ltd (SLR) has been engaged by Management 7bbh to provide a qualitative Ecologically Sustainable Design (ESD) assessment for the proposed mixed-use development (comprising Blocks A, B, C, D, E, F, G & H) located at 142-150 Narrow Neck Road, Katoomba. The ESD report has been prepared in a standard form considering the following aspects of the development.

- Identify how ESD principles are incorporated in the design and ongoing operation of the development.
- Demonstrate how the development will meet or exceed the relevant industry-recognised building sustainability and environmental performance standards.

The initiatives suggested throughout this report have been included as opportunities for the project team to adopt ESD initiatives that provide both direct and indirect benefits to the proposed development.

1.1 Site Description

The subject site is currently heavily vegetated along Narrow Neck Road to the West. There is a mix of single and two storey residential buildings to the North along Glencoe Road and there are new three-bedroom duplexes along the Escarpments to the South. The golf course is located to the east of the developments. The site is located in a residential zone – refer **Figure 1**.

Figure 1 Site Location

Image: Courtesy Nearmap, October 2024

1.2 Development Description

The proposed multi-building mixed-use development (refer **Figure 2)** spans 19,621 m^2 GFA and comprises

- 8 residential buildings (4-storeys each), including;
    - 52 Serviced apartments
    - A restaurant and communal spaces
    - 218 residential units

The surroundings of 142–150 Narrow Neck Road, Katoomba feature a mix of natural parks and modest residential buildings.

The area along Narrow Neck Road includes around 115 properties, mostly residential homes and holiday retreats.

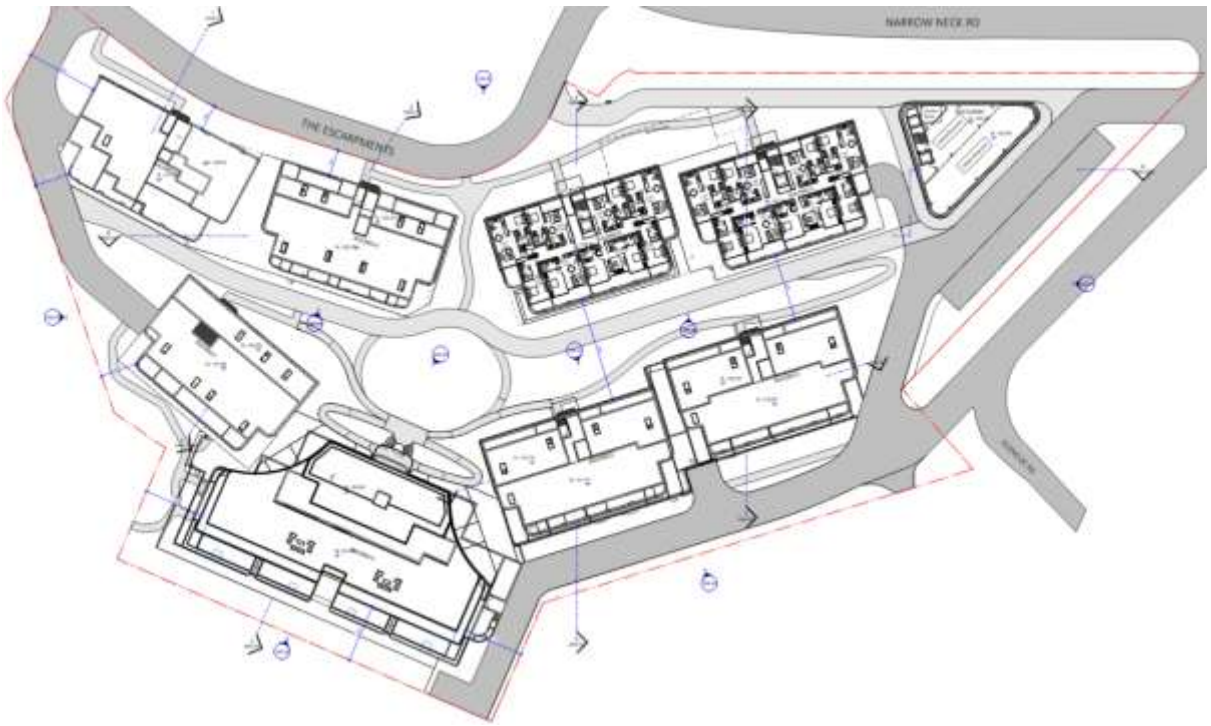
Figure 2 Level 01 Overall Plans

Figure 3 Level 02 Overall Plans

Figure 4 Level 03 Overall Plans

Figure 5 Level 04 Overall Plans

Figure 6 Level 05 Overall Plans



2.0 Ecologically Sustainable Design

The concept of Ecologically Sustainable Development (ESD) was outlined in “Our Common Future”, the report of the 1987 United Nations World Commission on the Environment and Development (the Brundtland Commission). It defined Sustainable Development as,

“Development that meets the needs of the present without compromising the ability of future generation to meet their own needs”.

This concept was adopted within Australia in 1990 when the Council of Australian Governments endorsed a National Strategy for Ecologically Sustainable Development. The Commonwealth Government suggested the following definition for ESD in Australia:

“Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased”.

Put simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations. To do this, it is necessary to develop ways of using those environmental resources which form the basis of our economy in a way which maintains and, where possible, improves their range, variety and quality.

The National Strategy for Ecologically Sustainable Development notes that there is no identifiable point where it can be said that ESD has been achieved. The strategy further states that there are two main features which distinguish an ecologically sustainable approach to development:

- We need to consider, in an integrated way, the wider economic, social and environmental implications of our decisions and actions for Australia, the international community and the biosphere; and
- We need to take a long-term rather than short-term view when taking those decisions and actions.

Ultimately ESD should lead to changes in our patterns of resource use, including improvements in the quality of our air, land and water, and in the development of new, environmentally friendly products and processes.

National Strategy for ESD Objectives and Guiding Principles are elaborated below.

The National Strategy for ESD sets its core objectives as:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations.
- To provide for equity within and between generations.
- To protect biological diversity and maintain essential ecological processes and life-support systems.

The Guiding Principles of the National Strategy for ESD are documented as:

- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- The global dimension of environmental impacts of actions and policies should be recognised and considered.

- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised.
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
- Decisions and actions should provide for broad community involvement on issues which affect them.

These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that considers all these objectives and principles to pursue the goal of ESD.

2.1 Specific Requirements for Compliance

Specifications for environmental design measures required for the proposed site are detailed below:

2.1.1 ESD Measures for Consideration

- National Construction Code (NCC) 2022 Section J for the Non-residential Component.
- BASIX Certification for the Residential Component.
- Blue Mountains Development Control Plan 2015
- Blue Mountains Local Environmental Plan 2015
- The State Environmental Planning Policy (SEPP) Sustainable Buildings
    - Non-residential spaces should target the following:
        - the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,
        - a reduction in peak demand for electricity, including through the use of energy efficient technology,
        - a reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design,
        - the generation and storage of renewable energy,
        - the metering and monitoring of energy consumption,
        - the minimisation of the consumption of potable water.
        - the embodied emissions attributable to the development have been quantified.
    - Residential spaces should satisfy the following-
        - the embodied emissions attributable to the development have been quantified.
- Apartment Design Guidelines for residential areas
    - Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid-

winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas.

- In all other areas, living rooms and private open spaces of at least 70% of the apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid-winter.
- A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid-winter.
- At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.

  Building depth, which support natural ventilation typically range from 10 to 18 meters.

The following section elaborates on how the above requirements are captured in the design and how the project responds to these controls.

3.0 ESD Initiatives Considered 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. SLR Consulting, as the project's ESD consultant, has applied these principles to all aspects of the development ensuring a best possible ESD outcome.

ESD indicators identified for the proposed concept plan are:

- Passive design features
- Landscaping
- Building construction
- Active energy efficiency
- Water
- Transport
- Indoor environmental quality
- Operational waste management
- Renewable energy options

The following sections below will outline the ESD initiatives to be committed for the proposed development.

3.1 Passive Design Features

Passive energy efficiency refers to the choice of building materials, the placement of external facades and fenestration to effectively utilise solar energy for heating when required, and minimise solar gains when appropriate, thus 'passively' reducing the artificial heating and cooling requirements of the building. While high cooling and heating loads are typical in summer and winter months respectively, a good balance of heating and cooling load reduction techniques is required to facilitate a development with efficient passive design.

3.1.1 Site Analysis and Layout

A key objective should be to optimise site conditions and minimise energy consumed for cooling and heating loads through proper selection of building orientation and internal layout. The following points are noted with respect to the siting of the proposed development.

- As opposed to new developments on the outer fringes of the city which require significant investment in new roads, sewerage, lighting and power the proposed development site will have immediate access to all of these;
- The proposed development provides a large number of units with access to daylighting;
- The proposed development provides good design to promote natural ventilation;

3.1.2 Solar Access

One of the objectives of energy conservation is to minimise the heating and cooling requirements of buildings. Sunlight should preferably be able to penetrate the building in

winter and be excluded from the building in summer. The form dictated by the site has been designed to maximise the solar access of residential units by:

- Maximising solar exposure of every residential apartment. The height and units' layouts will allow excellent solar exposure from at least 2 directions to the majority of the apartments throughout the day, year-round.
- Ensuring that primary facade glazing is attached to all "living zone" rooms for all apartments (i.e. living room, bedrooms etc). With proper attention to design details (e.g. glazing seals), these rooms can act as highly efficient solar collectors especially during winter months.
- Incorporating deep balconies to reduce summer thermal loads on the residential units.

The Apartment Design Guide - Part 04 is relevant to the assessment of the daylight access into residential components of the project. The above guide states that:

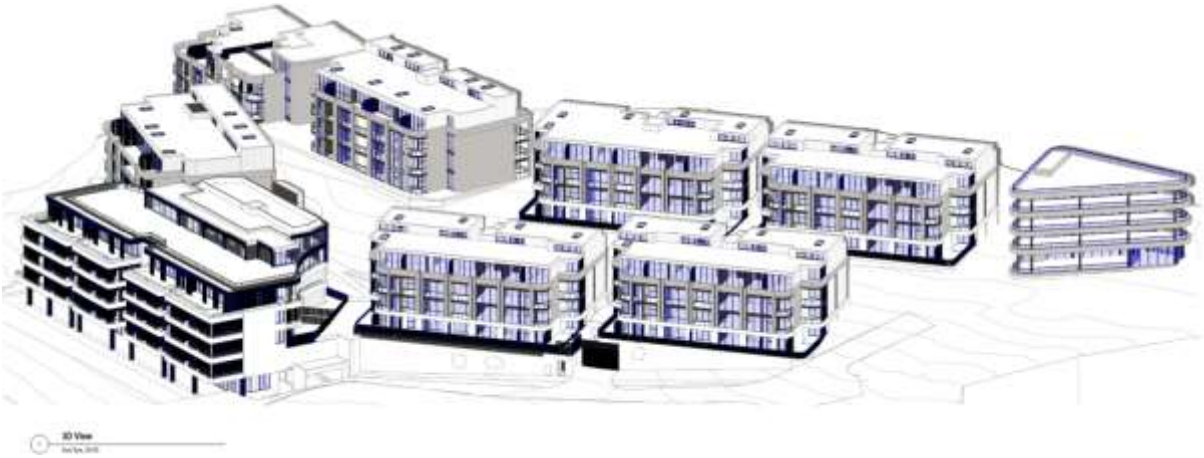
- Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid-winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas.
- In all other areas, living rooms and private open spaces of at least 70% of the apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid-winter.
- A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid-winter.

From the model provided SLR has calculated the below summarised ADG assessed direct sunlight to residential apartments for June 21, between the hours of 9.00 am and 3.00 pm.

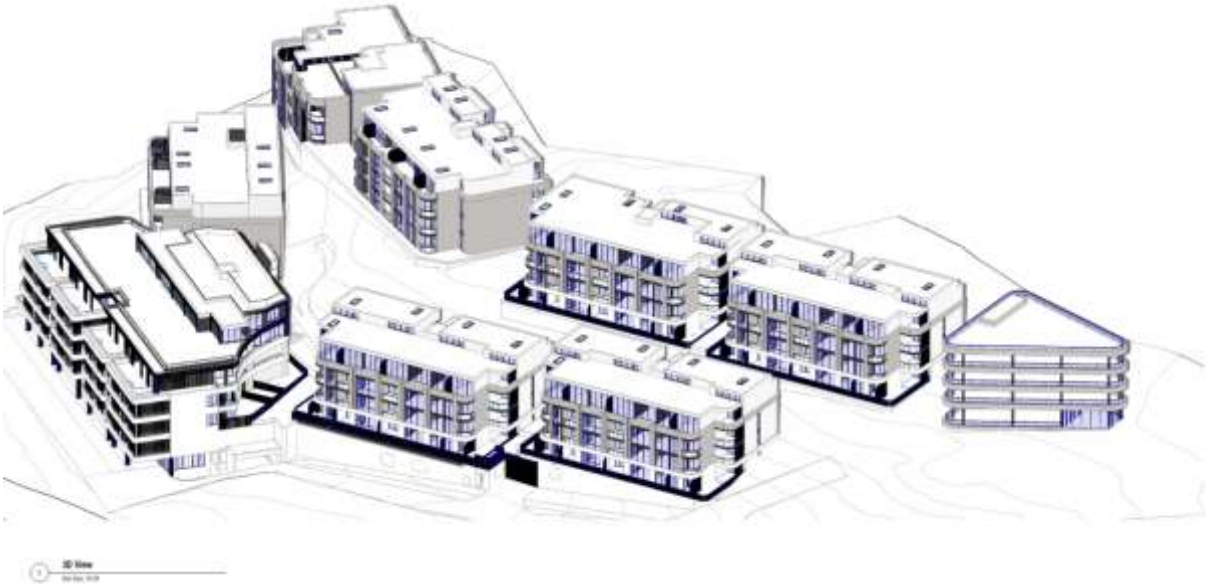
- 62.4% (136 out of 218) of apartments will achieve 3 hours solar access across the assessment window. 3% (7 out of 218) of apartments will receive no solar access across the assessment window.

Figure 7 Sun Eye View Diagrams

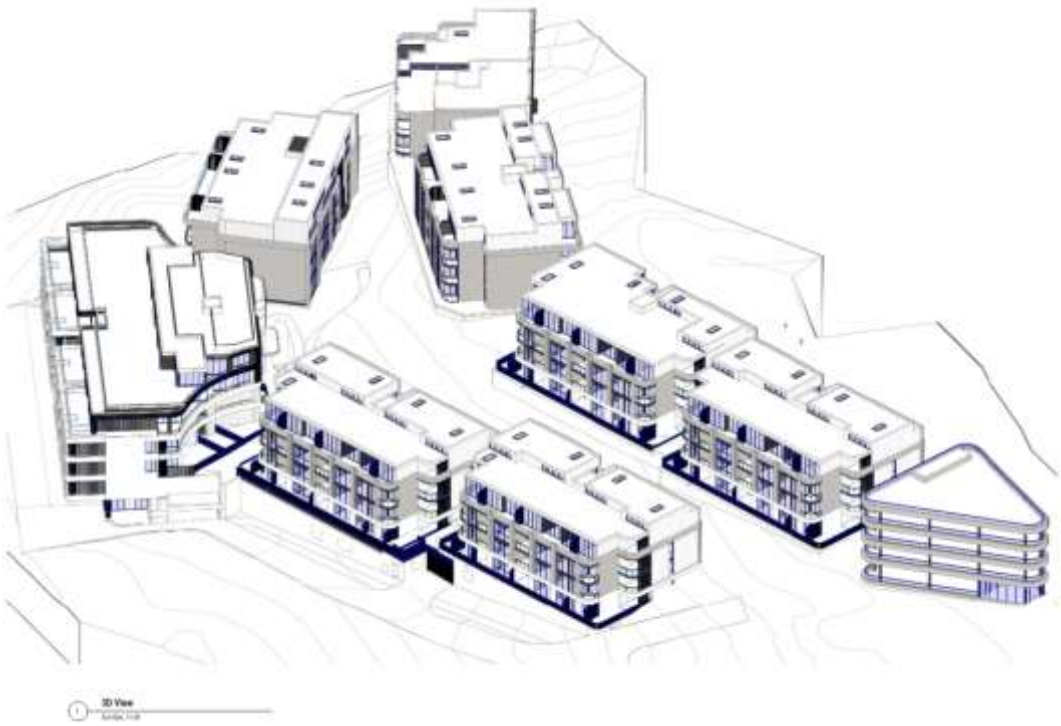
Time – 9.00am (June 21st)



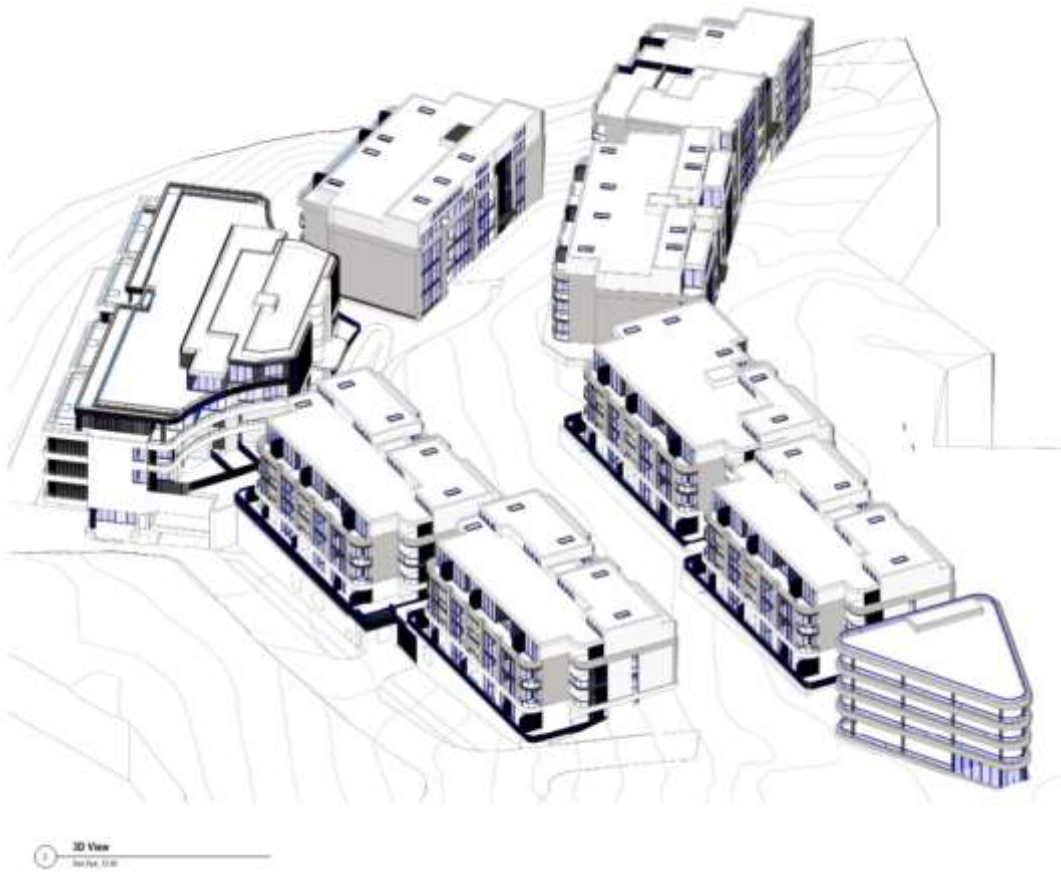
Time – 10.00am (June 21st)



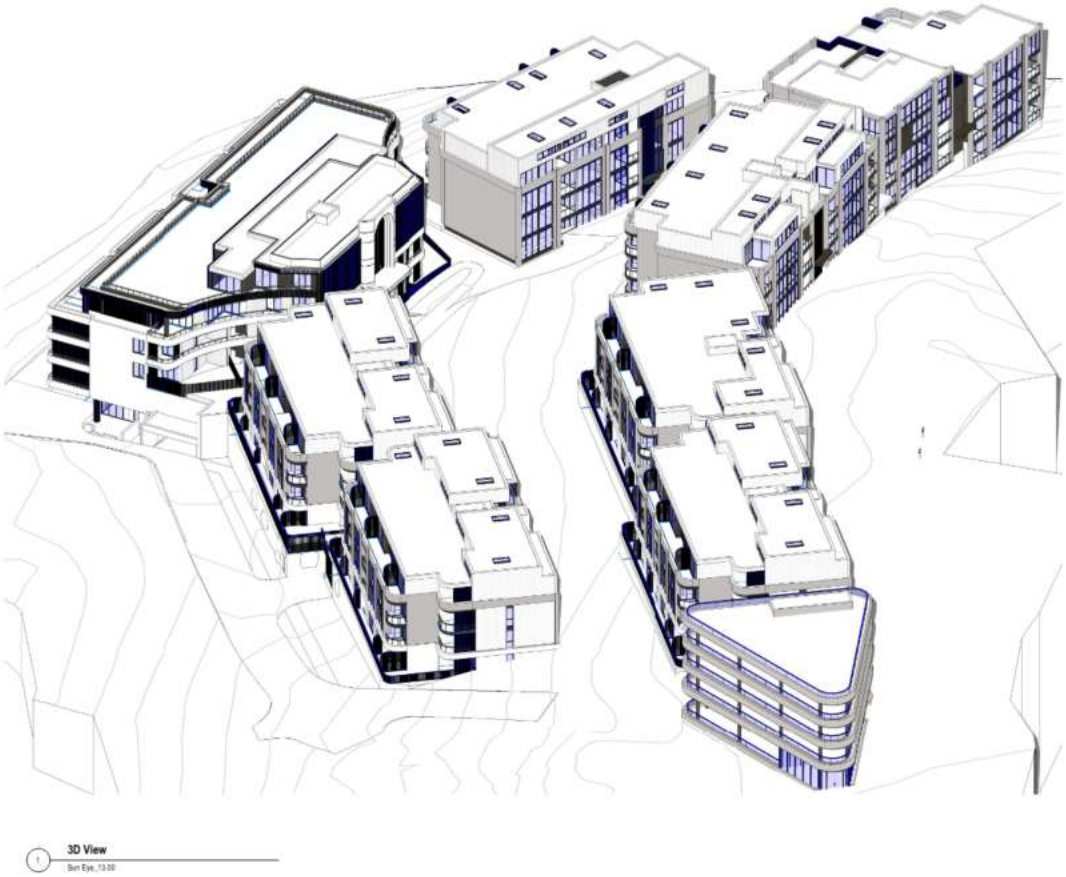
Time – 11.00am (June 21st)



Time – 12.00am (June 21st)



Time – 13.00pm (June 21st)



1 3D View
Sun Eye, 13.00

Time – 14.00pm (June 21st)

1 3D View
Sun Eye, 14.00

Time – 15.00pm (June 21st)

3.1.3 Natural Ventilation

Wind-induced natural ventilation works on the straightforward principle of differential pressure. If a building envelope has multiple openings and there exists a pressure difference between those openings, e.g. the wind pressure at one opening is greater than the pressure at the other openings; airflow will be pushed through the building in the direction positive to negative.

The resulting amount of airflow through the building envelope will be a function of the magnitude of the pressure differential, size of the various building openings and degree of "blockage" in between.

3.1.3.1 Residential Apartments

The most important role of natural ventilation in the context of the residential apartments is to remove accumulated heat gain during periods of overheating. In this case, ventilation is intended to achieve predicted rates of volumetric air change. Also important during the summer months is the role of ventilation in directly improving the perception of thermal comfort by occupants of a space. This is achieved when moving air aids the evaporation of perspiration by passing over the skin. If there is some air movement, most people will tolerate somewhat higher temperatures.

Heat build-up within apartments through daytime summer temperatures can be quickly purged with the availability of suitable breeze at the site.

The ADG encourages cross ventilation to be assisted by the building design. Building design should enable ventilation to be controlled, where comfort levels are maintained for the occupants during the summer and winter extremes. Locations of windows and openings within the apartment are to be suitably in line, where possible, with each other on opposite sides of the room. It is recommended that building openings be designed such that cross-ventilation is maximised, to minimise heat gain in summer.

Ventilation of building is achieved by permanent openings, windows, doors or other devices which have an aggregate opening or openable size of not less than 5% of the floor area of

the ventilated room. The provision of ceiling fans for use in summer months is also encouraged.

In winter it is important to close off heated areas that need warming. The opportunity to open and close balcony doors will allow adequate control to moderate the impact of any higher than comfortable winds. It is recommended that the following initiatives are also incorporated to minimise heat leakage from the building:

- Design detailing of the glazing interface to the window framing system and the provision of adequate sealing in accordance with the National Construction Code (NCC).
- Doors leading to hallways, stairwells and non-common use areas provided with draught excluders to limit heat losses during winter months.
- Doors located throughout the development in general-use areas, such as access ways to/from the building, fitted with door closers where it is deemed that their opening will have an adverse effect on heat loss during winter.

ADG specifies the following rules of thumb:

- At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.
- Building depth, which support natural ventilation typically range from 10 to 18 meters.
- Developments, which seek to vary from the minimum standards, must demonstrate how natural ventilation can be satisfactorily achieved, particularly in relation to habitable rooms.

Based on the cross-ventilation assessment carried out, 61% of the units achieves cross ventilation.

Figure 8 Cross Ventilation Assessment for a Typical Level

3.2 Building Construction

3.2.1 Building Massing

The proposed development will have a compact form requiring less heating and cooling than low-rise buildings that would tend to sprawl out over a site. Apartments will “share” heat with their adjacent neighbours and so gain and lose less heat to the external environment.

3.2.2 Building Materials

3.2.2.1 Walls

It is recommended that external walls are autoclaved aerated concrete (AAC) veneer with R2.0 acoustic insulation where required. The use of this wall system will reduce the insulation required due to the inherent R value of the wall system. The insulation required will be determined by the NCC and Section J calculations.

It is recommended that intra-tenancy walls are to be lightweight plasterboard on stud or Shaftliner Party Wall with plasterboard with acoustic insulation where required. This is advantageous from a building life-cycle perspective, as it maximises the adaptive reuse potential when a building reaches the end of its intended use.

3.2.2.2 Roof

It is proposed to use concrete roof with plasterboard ceiling construction for all apartments throughout the building. R3 insulation is to be provided to roof/ceiling areas exposed to open air above. The insulation required will be determined by the NCC and Section J calculations. Waterproofing membrane will also be provided as part of the roof.

3.2.2.3 Glazing

Performance Glazing is recommended for most units, this will reduce the solar heat gain mostly on the western and eastern facades where low angle solar rays penetrate beneath shading devices. The glazing required will be determined by the NCC and Section J calculations.

3.2.2.4 Floor and Thermal Mass

Concrete slab construction is to be used for all floors throughout the development in accordance with BASIX and NCC Section J requirements. Concrete has amongst the highest thermal mass capacity among a range of common building products, as presented in the below table.

Generally, denser materials have higher mass which has the ability to store heat energy and then release it slowly to the room. This storage effectively smoothens out daily temperature variations within conditioned spaces, with corresponding reductions in both heating and cooling loads. Insulation is to be provided to floor areas exposed to open air.

Table 1 Indicative Thermal Mass Values of Various Materials

Material	Thickness (mm)	Thermal Mass ($kJ/m^2.K$)
Dolerite (Rock / Stone)	200	433
10-31 Solid Brick	190	410
Concrete	100	221
Concrete block	90	194
10.01 regular brick	90	151
Clay brick (3.5 kg solid + 0.5 kg mortar)	110	142
Aerated concrete block	100	50
Fibre cement sheet (compressed)	18	32
Wood flooring (hardwood)	19	25
Weatherboard (softwood)	15	16
Fibre cement sheet	6	8
Plasterboard	10	8
Glass	3	6
Expanded polystyrene (EPS-class SL)	50	1.8
Cork	6	1.6
Rockwool (batts)	50	1.5
Fibreglass (batts)	50	0.5
Air	50	0.5

3.2.3 Building Sealing

The purpose of sealing is to ensure that additional heating and cooling loads 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 bathroom/toilet and laundry exhaust fans in the proposed development must be fitted with a sealing device such as a self-closing damper or the like.

3.3 Active Energy Efficiency

Active energy efficiency is achieved by putting in place energy efficient electrical items such as air-conditions systems, artificial lighting to reduce the energy usage of the building.

3.3.1 Mechanical Ventilation and Air Conditioning

Where mechanical ventilation is required, the use of energy efficiency measures will be fully explored during detailed design. These measures include linking mechanical ventilation to manual switching where allowable under the NCC and using individual fans rather than a common ducted ventilation system with constant operation. These initiatives will provide significant savings in energy use and associated operational energy costs of the development.

Single phase air conditioning is recommended for residential spaces with 4 star rating for heating and 3 star rating for cooling requirements.

For non-residential spaces, high efficiency air conditioning system complying with Section J requirements is recommended.

3.3.2 Domestic Hot Water

Centralised energy efficient instantaneous gas fired hot water system is recommended for water heating within the proposed development.

3.3.3 Green Power Initiative

It is recommended that a significant percentage of “Greenpower” should be made available to residents, providing the opportunity to contribute to a reduction in total greenhouse gas emissions produced by the proposed development. Greenpower is produced from environmentally friendly renewable energy sources such as solar, wind, water and biomass.

When a Greenpower product is selected by the owner, the energy supplier commits to buying a certain amount of electricity from approved new renewable energy sources. The financial accounts of Greenpower suppliers are audited independently. This makes a clear distinction between the services provided by standard energy suppliers and the more sustainable service offered through Greenpower options.

The National Greenpower website[1] states that “Australian households generate almost one-fifth of Australia's greenhouse pollution through everyday activities such as transport and household energy use”. The average household in Australia emits over seven to eight tonnes of greenhouse pollution each year through energy use alone. This is because most

[1] http://www.greenpower.gov.au

households source their electricity from burning coal and other fossil fuels. By choosing accredited Greenpower, up to 100% of a household's energy usage can be generated from renewable sources.

3.3.4 Lighting

3.3.4.1 Natural Lighting

The proposed development maximises daylighting opportunities in most units, therefore minimising the use of artificial lighting.

3.3.4.2 Artificial Lighting

Household lighting energy use in Australia is increasing due to the construction of larger homes and the installation of more light fittings per home. It is estimated that most homes could readily reduce the amount of energy they use for lighting by 50% or more.

Lighting installations require a design that properly considers the conservation of scarce energy resources. Sustainable lighting design ensures that illuminance is not excessive, that the switching arrangements are such that unnecessary illumination may be turned off and that the illumination is provided in an efficient manner.

There are additional energy losses associated with inefficient lamps and lighting losses associated with luminaries. Consequently, a lighting design which uses the most efficient lamp types and the least number of luminaries for a given design illuminance will be more efficient and usually have a lower capital cost.

It is likely that the lighting to be used within the development will incorporate LED lamps generally. It is recommended that the following lighting features be incorporated into the development to minimise energy consumption due to lighting:

- Maximise use of LED and minimise or where possible eliminate the use of halogen down lights, as LED are much more efficient than halogen lighting.
- The external lights are operated on a combination of daylights sensors and time clock.
- Use of lighting systems incorporating appropriate switching zones, time clock control and motion sensors is also proposed to optimise energy efficiency for lighting.

Furthermore, the project will comply with the NCC requirements of maximum illumination power densities.

3.3.5 Appliances

For BASIX compliance, the below measures for energy performance in residential appliances could include:

- 3-star energy efficient dishwashers;
- 3.5-star energy efficient clothes dryer;
- A gas cooktop and electric oven to be installed within each residential dwelling.

3.4 Water

Australians use more than one million litres of freshwater per person each year (source: Green Building Council of Australia 2006).

In addition to increased water use efficiency, new developments can reduce potable water demand by residents, and visitors through the provision of an on-site alternative water supply. There are three principal forms of alternative water supply:

- Reticulation of reclaimed water to the site
- Rainwater/stormwater storage and reuse
- Grey water storage and reuse.

It is recommended that the above types of alternate water supply be explored for use in landscape irrigation and fire services, reducing the demand for potable water.

Appropriate rainwater/stormwater tanks are recommended to be included in the design.

3.4.1 Water Efficiency

The minimum sustainable standard for water efficient fixtures and fittings is 3 star. To achieve greater than the standard level, following water efficient fixtures and fittings are recommended for the proposed site:

- All residential kitchen and bathroom taps are 4 star;
- All shower heads are 4.0 star (>4.5 but <=6 L/min);
- All residential toilet flushing systems are 4 star;
- All residential dishwashers are 2 star;
- All common area toilet flushing systems are 4 star;
- All common area taps are 4 star.

Implementation of the above recommendations will assist in reducing the water consumption.

In addition, the project considers rainwater reuse for irrigation purposes.

3.4.2 Landscape Irrigation

Based on international best practice guidelines, it is generally recommended that either 90% of the water requirement for landscape irrigation is sourced from on-site rainwater collection or recycled water. Alternatively, best practice would also be achieved with the installation of a water efficient irrigation system comprising subsoil drip systems and automatic timers with rainwater or soil moisture sensor control override.

The landscape design should focus on using native coastal and other drought resistant species that rely primarily on rainwater for their water needs. The following is recommended to be incorporated into the development to minimise water consumption for landscape irrigation.

- Native coastal and other drought resistant species that rely primarily on rainwater for their water needs where appropriate and possible;

3.5 Transport

When designing a sustainable development, it is important to minimise the use of individual motorised transport where possible and thus enhance energy savings and environmental impact through reduced fossil fuel consumption and improved regional air quality. This can be achieved by encouraging the use of energy efficient public transport that is immediately at

hand, reducing car parking facilities, and providing adequate bike storage facilities to minimise the requirement for individual motorised transport.

The project site is surrounded by many public transport options such as train stations, and bus stops. The site is approximately 2.9 kilometres (km) from Katoomba Station and 4.1km from Blue Mountains Transit Bus Depot. It is also well serviced by local buses with stops in proximity to the site along Acacia Street in both directions.

3.5.1 Facilitation of Pedestrian and Non-motorised Transport

Bike storage facilities are recommended to be included in the proposed development, which will help to minimise the requirement for individual motorised transport. The development's communal facilities are also proposed to include a wellness centre.

Sufficient recreational opportunities are easily accessible to occupants, eliminating the requirement for long-distance motorised transport for most recreational activities. This would be a positive feature of the development with regards to sustainability as this clearly avoids greenhouse gas emissions that would otherwise have been produced if residents had to travel long distances for recreational activities.

3.6 Indoor Environmental Quality

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

3.6.1 Asbestos

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

3.6.2 Internal Noise Levels

Internal noise levels are a significant factor in determining occupant and customer satisfaction and well-being. The aim of controlling internal noise levels is to encourage and recognise buildings that are designed to maintain internal noise levels at an appropriate level. Further information can be found in the Acoustic Report developed for the project.

3.6.3 Carbon Monoxide Monitoring and Control

Elevated carbon monoxide (CO) levels are indicative of inadequate ventilation, affecting the quality of air within an enclosed occupied space, and the health of the occupants. CO monitoring systems can detect elevated concentrations of CO and automatically adjust ventilation supply rates before indoor air quality becomes problematic.

SLR Consulting recommends investigating a CO monitoring system to the internal carpark areas where appropriate to satisfy NCC requirements.

3.6.4 Paints and Floor Coverings

SLR recommends the use of paints and floor coverings with low levels of volatile organic compounds (VOC) and low formaldehyde wood products where possible.

3.7 Operational Waste Management

An Operational Waste and Recycling Management Plan is a minimum requirement to meet sustainable building design best practice. The Waste and Recycling Management Plan includes:

- Separate waste and recycling streams;
- Transfer of material to common storage area;
- Communal storage areas;
- Frequency of collection; and
- Signage and educational initiatives for occupants.

A Waste Management Plan is recommended to track all waste going offsite to show that at least 80% of all construction waste is re-used or recycled.

3.8 Renewable Energy Options

As the worldwide demand for fuel increases, alternative and renewable energy sources are emerging as economical and sustainable. 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.

SLR recommends the installation of a solar PV system.

- A 40 kW PV solar system is recommended to minimise greenhouse gas emission.
- A 40 kW PV solar system will offset approximately 57.4 MWh/year of energy usage.
- The estimated greenhouse gas CO2 emission saving is approximately 38.4 t.CO2/annum.

4.0 Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Management 7bbh to provide a qualitative Ecologically Sustainable Design (ESD) assessment for the proposed mixed-use development (comprising Blocks A, B, C, D, E, F, G & H) located at 142-150 Narrow Neck Road, Katoomba.

This report forms part of the HDA for the project site.

This assessment has been based on the DA Drawings, issued December 2025

The proposal consists of:

- 8 residential buildings (4-storeys each), including;
    - 52 Serviced apartments
    - A restaurant and communal spaces
    - 218 residential units

The development includes many ecologically sustainable design features. This report provides an overview of these features.

The following ESD and energy efficiency features are proposed to be included in the design:

- The proposed development will incorporate passive and active energy-saving measures such as operable windows to enhance natural ventilation through the apartments, where appropriate;
    - 61% of the proposed residential units are naturally cross-ventilated.
- The form dictated by the site has been designed to maximise the solar access of residential units;
    - 62.4% (136 out of 218) of apartments will achieve 3 hours solar access across the assessment window.
    - 3% (7 out of 218) of apartments will receive no solar access across the assessment window.
- Thermal mass - Concrete slab construction is proposed for all floors throughout the development - concrete has amongst the highest thermal mass capacity of a range of common building products. The proposed development's external walls, structural internal walls, and slabs should be predominantly high thermal mass materials.
- LED energy-efficient lighting for all spaces;
- Centralised energy-efficient gas instantaneous hot water system;
- Individual 1-phase air-conditioning system for all living areas and bedrooms in the dwelling units with 4 star rating for heating and 3 star rating for cooling requirements;
- For non-residential spaces, high efficiency air conditioning system complying with Section J requirements is recommended;
- Dishwasher units to be installed within each residential dwelling. The dishwasher units are to have an energy efficiency rating of at least 3 stars;
- Clothes dryer units to be installed within each residential dwelling. The clothes dryer units are to have an energy efficiency rating of at least 3.5 stars;
- Provision of gas cooktop and electric oven;

- Water efficient bathroom and kitchen fittings;
    - All residential kitchen and bathroom taps are 4 star;
    - All shower heads are 4.0 star (>4.5 but <=6 L/min);
    - All residential toilet flushing systems are 4 star;
    - All residential dishwashers are 2 star;
    - All common area toilet flushing systems are 4 star;
    - All common area taps are 4 star.
- Light efficiency measures in the lobby using time clock and motion sensors;
- Low levels of volatile organic compounds (VOC) paints and floor coverings and low formaldehyde wood products where possible;
- Landscaped areas are within the residential development throughout the designated communal areas. Proposed planting provides added cooling during the summer months through the leaf transpiration process and is also useful for wind amelioration;
- Plant species within the development would be predominantly indigenous species that can tolerate low water to reduce maintenance requirements; and
- SLR recommends the installation of a solar PV system.
    - A 40 kW PV solar system is recommended to minimise greenhouse gas emission.
    - A 40 kW PV solar system will offset approximately 57.4 MWh/year of energy usage.
    - The estimated greenhouse gas CO2 emission saving is approximately 38.4 t.CO2/annum.
- The proposed residential development will enjoy a high level of thermal comfort gaining an average 7 NatHERS star rating.
- The development also meets BASIX targets in Water (Target 40) and in Energy (Target 45).

The report body contains recommendations regarding other ESD features, such as a mechanical ventilation system, domestic hot water, other appliances, and operational waste. These features will help achieve significant reductions in energy and water required by the development both in building and operation, in addition to ensuring that the residential units are pleasant spaces to reside.

It is recommended that the proposed ESD initiatives continue to be developed and implemented throughout this project.

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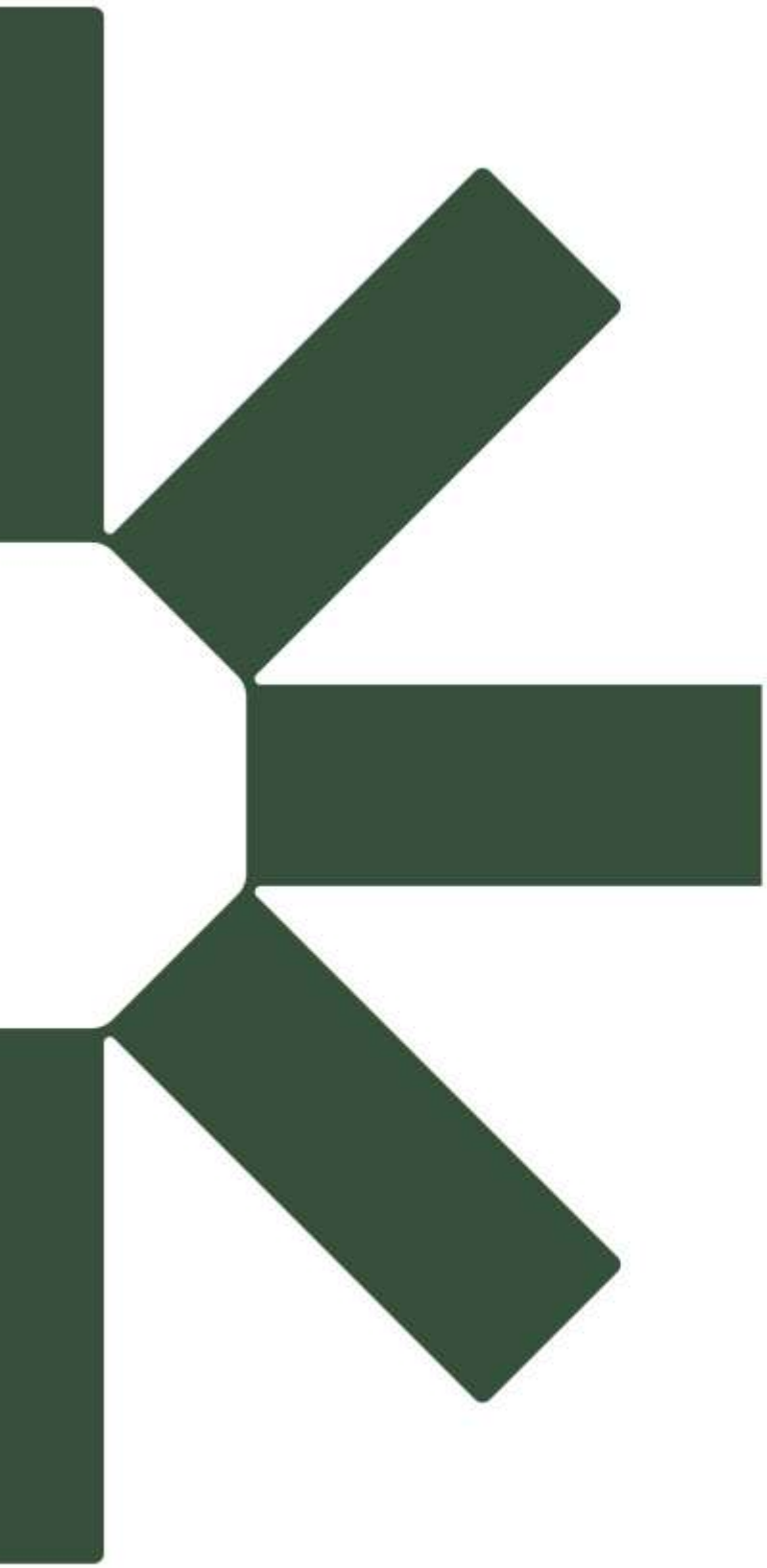

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