lid Low Impact Development Consulting

Environmentally Sustainable Design

Sustainable Design Assessment for:

718-724 High Street Road, Glen Waverley

Prepared for: Jesse Ant Architects
Prepared by: Jorge Riesco – Low Impact Development Consulting

23/12/20212

e: info@lidconsulting.com.au
p: 03 9016 9486
a: Suite 7, 252 St Georges Rd, Fitzroy North Vic 3068
w: www.lidconsulting.com.au

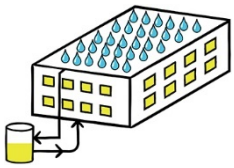
Version	Date	Description	Drawings	Prepared	Checked
1.0	23/12/2021	For Issue	Rev. A	JR	CH

Disclaimer

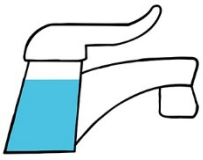
The content of this document represents the entirety of work output or recommendations offered by LID Consulting for this particular project. This content supersedes all other verbal discussions undertaken by LID Consulting representatives in relation to this project.

Development highlights

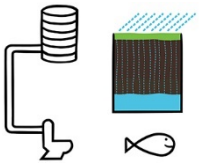
Energy efficient development that exceed the 6.5 star energy rating average



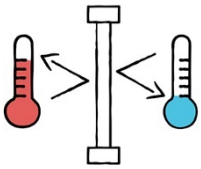
Potable (drinking) water savings – Two 8000L Rainwater tank connected to toilets and irrigation



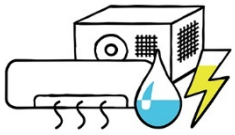
Potable (drinking) water efficient fixtures



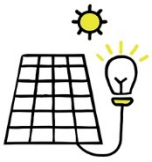
Onsite water use and infiltration - Best Practice Stormwater treatment



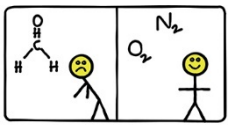
Improved energy efficiency - use of double glazed windows



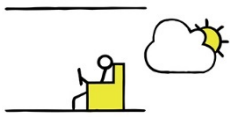
Energy and water efficient heating and cooling



Renewable energy minimum 10kW PV Panels



Improved indoor air quality due to reduced use of off-gassing materials

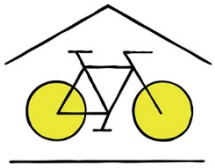


Daylight maximised for this living areas

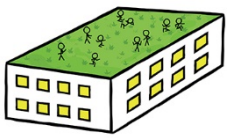
Avoidance of use of rainforest timbers

Environmentally friendly materials choices

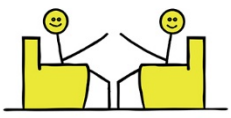
Excellent public transport on your doorstep



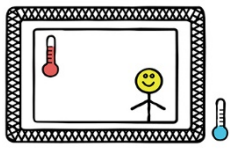
Undercover bicycle parking



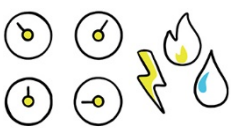
Communal roof top garden



Communal meeting space

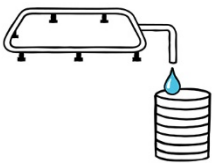


Well insulated building fabric and windows



Individual metering of services to each dwelling

Separate waste stream and recycling facilities



Capture and re-use of sprinkler run-out water

Contents

LID acknowledges and pays respect to the Australian Aboriginal and Torres Strait Islander people, to their ancestors and elders, past, present and emerging, as the traditional custodians of the lands upon which we work and live. We recognise Aboriginal and Torres

Strait Islander people's deep cultural and spiritual relationships to the water, land and sea, and their rich contribution to society.

Executive summary

Project summary

This ESD report is for the proposed residential development of 69 apartments at 718-724 High Street Road, Glen Waverley and is based on the drawing set provided by Jesse Ant Architects on the 7th of December, 2021. This report addresses the environmentally sustainable development requirements under Clause 22.13 of the City of Monash Planning Scheme, demonstrating best practice energy performance, water efficiency, indoor environment quality, stormwater management, sustainable transport, waste management and urban ecology.

This sustainability report details measures that meet and often exceed mandatory Environmentally Sustainable Design (ESD) requirements for this type of residential development.

The body of the report contains a full list of ESD initiatives to be included in the development. A summary of the major ESD initiatives committed to are included below:

- Net Zero carbon / carbon neutral capability
    - The development will be future proofed and built to enable near net zero carbon emissions capability in operation. The project has electricity rather than gas as it's fuel source for its largest energy uses: space heating and hot water heating.
- Energy
    - Energy efficient dwellings that meet or exceeds 6-star requirement.
    - Improved energy efficiency double glazed windows throughout the development.
    - 10% increase on required NCC2019 insulation levels
    - Energy efficient electric reverse cycle air-conditioning heating and cooling systems beyond minimum standards.
    - Renewable energy Photovoltaic (PV) Panels of minimum 10kW to supply power for common area lighting and all connected apartments and tenancies.
- Water and Stormwater
    - On-site water use and infiltration measures to meet CSIRO Best Practice Stormwater Management (Water Sensitive Urban Design) treatment quality requirements.
    - Two rainwater tanks each of size 8000L connected to all toilets to reduce potable water consumption and assist with stormwater quality management requirements. A 91m2 green roof garden will also be included.
    - Potable (drinking) water saving measures including low flow toilets, showers and taps.
- Indoor Environment Quality (IEQ)
    - Daylight levels assessed to Best Practice standards
    - Reduced indoor pollutants from the use of low off-gassing materials such as low VOC paints, carpets and adhesives, and low formaldehyde products
- Sustainable materials

    - Avoidance of the use of endangered rainforest timbers in this development.
    - Use of lower embodied carbon/energy alternatives for concrete.
    - More environmentally friendly material alternatives for timber, insulation and other building components
- Sustainable transport
    - Apartment developments will incorporate basic skeleton infrastructure to each car parking space to enable equitable potential zero carbon emissions electric vehicle (EV) transport for all residents if they choose to purchase an EV.
    - The development design encourages cycling as it includes readily accessible bicycle parking.
- Urban ecology
    - Inclusion of significant vegetation for Urban Heat Island (urban cooling) and biodiversity benefits

Generally, other non-mandatory guidelines and good design principles (eg. Green Star) have also been incorporated where deemed to be relevant in respect to the scope and nature of this development. This encourages further levels of sustainability above and beyond the mandatory requirements.

The proposed development advances basic sustainability principles by increasing the potential use of the site, in line with the surrounding environment. In the context of rising living costs and a need to limit use of material, energy and land resources, the proposed development enables a more affordable and energy efficient model of housing. The expected design life of this development would be in excess of 40 years.

Mandatory guidelines and tools addressed in this report as relevant to sustainability include:

- National Construction Code (NCC) / Building Code of Australia (BCA) Volume One Section J and Volume Two part 3.12 as relevant;
- Victorian Planning Policy (VPP) and Local Planning Policy (LPP) clauses including
    - 11 Settlement
    - 12 Environmental and Landscape Values
    - **15.02-1S Energy and Resource Efficiency**
    - 18.02-R Sustainable Personal Transport
    - 19.01-2R Renewable Energy – Metropolitan Melbourne
    - 21.13 Sustainability and Environment
    - **22.13 Environmentally Sustainable Development**
    - **22.04 Stormwater Management (WSUD)**
    - **53.18 Stormwater Management in Urban Development**
    - 55.07 Apartment Developments
    - 58 Apartment Developments (of 5 or more storeys)
- Built Environment Sustainability Scorecard (BESS); and
- The STORM assessment.

The proposed development will address the relevant ESD requirements of the above planning scheme provisions.

Results summary

Further to the above initiatives and in conjunction with others listed in this report, the development was assessed using the 'Built Environment Sustainability Scorecard' (BESS),

obtaining a total score of **53% and passing all mandatory categories.** A score of 50% or greater (including compliance under water, energy, stormwater and IEQ categories) demonstrates a Best Practice environmentally sustainable development.

Commitment & documentation on plans

The "ESD initiatives" in each section can be included in a notes box on the plans, or the report can be referenced in a single note, such as: "The ESD report associated with these plans forms a part of the town planning submission, it is therefore required to be read in conjunction with drawings' notes and specifications, and applied accordingly."

Where applicable, also indicate on the relevant parts of the plans the water tank size and location, raingarden size and location, shading devices, the openable component of a window, air-conditioners condensers, clotheslines, bicycle racks, external materials, solar panels, hot water system type, car park CO sensor, EV charging station and other relevant readily shown items.

Abbreviations used in this report include:

- BCA – Building Code of Australia
- SDAPP – Council Sustainable Design Assessment in the Planning Process
- SDS – Sustainable Design Scorecard
- BESS – Built Environment Sustainability Scorecard
- BADS – Better Apartment Design Standards (Victorian Planning Provision Clause 55.07 and Clause 58)

1 Net zero carbon emissions - Carbon neutral energy capability

Goals

- To encourage development that minimises greenhouse gas emissions (cl15.02-1S)

Minimising greenhouse gas emissions means reducing carbon dioxide (carbon) emissions. Actions to minimise emissions can occur during the operation of a building, and also during the construction of that building/development.

Minimised greenhouse gas emissions from operational energy consumed

Net zero carbon/carbon neutrality in operational energy consumption is not difficult to achieve in new developments.

Developments can be built to be net zero carbon/carbon neutral emissions capable in terms of operational energy consumption where the energy source can readily be supplied from a renewable, fossil free fuel source. Electricity is an energy source for buildings that can readily be sourced from renewable energy whether from onsite solar photovoltaic (PV) panels, or offsite solar PV systems or wind via readily accessible GreenPower or carbon neutral energy purchasing. Installing electricity infrastructure ensures building occupants can readily choose when they wish to purchase 100% renewable zero carbon energy.

In addition standard, business as usual purchasing of electricity from the electricity grid is increasingly relying on more renewables for electricity generation. In the last year 32.8% of Victoria's grid electricity came from renewable electricity[1]. By 2025 this will be 40%, and 50% by 2030[2]. All electric services and appliances will automatically become greener due to the greening of the electricity network.

Natural gas on the other hand is methane and produces carbon dioxide when burned in heating, hot water or cooking. While trials are occurring for introducing clean burning hydrogen into our gas network, no clear path is confirmed on how and when all of the network could deliver beyond 10% hydrogen.

Installing gas infrastructure into buildings ties the development to burning a greenhouse gas fuel until the infrastructure is replaced. It is better for the environmentally conscious tenants and future users not to install gas infrastructure at the time of building development.

Carbon neutral energy supply ready	The development will be built to facilitate going net zero carbon emissions in operation. • Space heating and cooling will be heat pump technology, not gas. • HWS will be electric.	Additional sustainability practice

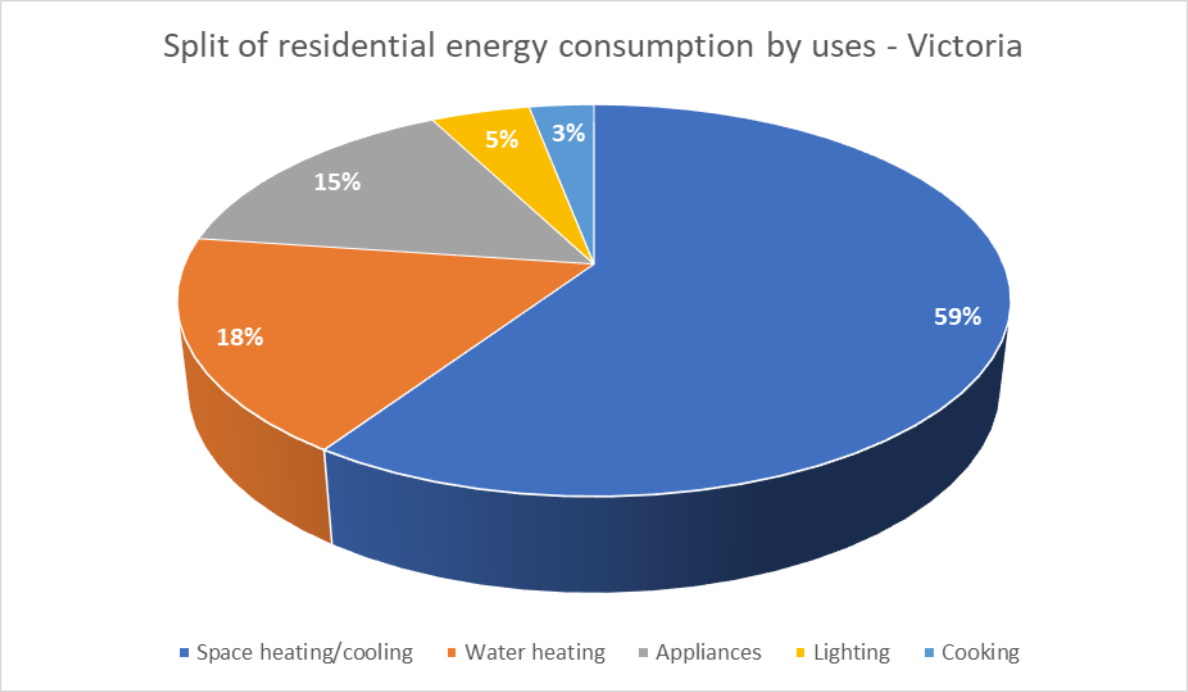
[1] OpenNEM https://opennem.org.au/energy/vic1/?range=1y&interval=1M 18 Oct 2020-18 Oct 2021.
[2] Victorian Government legislated Renewable Energy (Jobs and Investment) Act 2017 https://www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets

Gas is used broadly and heavily in Victoria. **Almost 90% (88%) of Melbourne homes are dual fuel**[3] i.e. they use both gas and electricity, and 75% of average dwelling energy use is gas (see table below). Gas is typically used for space heating, hot water heating and for cooking, and electricity for all other uses.[4]

Average daily energy use of Melbourne homes and split for dual fuel dwellings (almost 90% of dwellings)

Average dwelling energy use	Energy use per day	% of total dwelling energy use
Electricity	12 kWh/day	25%
Gas	36.5kWh/day	75%
Total energy consumption	**48.5kWh/day**	**100%**

In Victoria, space conditioning (heating and cooling our buildings) is the largest component of residential buildings' energy consumption followed by hot water heating. This is a significant opportunity for reducing operational energy consumption.



Split of residential energy consumption by uses – Victoria 2015[5]

[3] Department of Health and Human Services Victoria, 'Victorian Utility Consumption Household Survey', Department of Health and Human Services Victoria (DHHS), 3 May 2019, https://www.dhhs.vic.gov.au/victorian-utility-consumption-household-survey.
[4] Department of Health and Human Services Victoria.
[5] Paul Ryan and Alan Pears, 'Unravelling Home Energy Use across Australia - Renew', Renew, 23 May 2019, https://renew.org.au/renew-magazine/efficient-homes/unravelling-home-energy-use-across-australia/.

Minimised greenhouse gas emissions during construction

Net zero carbon emissions / carbon neutrality in the construction of a building takes a little more thought or expense than net zero carbon emissions / carbon neutrality in the operational energy of a building. There is a very high level of embodied energy (carbon) built in to most materials used.

Simple approaches can minimise embodied carbon in new buildings:

1. Source materials locally where possible to reduce carbon emissions generated in transport
2. Maximise timber use
3. Select materials variants that utilise lower carbon inputs. There are variants available within most material types. A key low carbon variant is where waste or recycled products from other industrial processes are used such as with greener conc.

See Materials section of this report for more detail on lower carbon construction options.

2 Energy Efficiency

Goals

- To improve the efficient use of energy by ensuring the development demonstrates potential for ESD initiatives at the planning stage
- To reduce total operating greenhouse gas emissions
- To reduce energy peak demand through particular design measures (e.g. appropriate building orientation, shading to glazed surfaces, optimise glazing to exposed surfaces, space allocation for solar panels and external heating and cooling
- Improve efficiency in energy use through greater use of renewable energy technologies and other energy efficiency upgrades (cl.15.02-1S)

Initiatives

Energy Rating	Current mandatory 6 star average (5 star minimum) energy efficiency requirements for class 2 dwellings will be met or exceeded. The development is targeting a 6.0 average star rating for all dwellings, with preliminary energy ratings indicating the development can achieve an average of 6.6 stars across the project.	SDAPP – Energy efficiency / BESS tool / BCA (Exceeded)
Maximum Cooling Loads	Dwellings in the proposed development will meet the residential maximum cooling load requirement for the relevant climate zone. This development is located in NatHERS climate zone '62 – Moorabbin Airport' with an annual cooling limit of 21MJ/m^2. The maximum cooling load for the development is 21 MJ/m^2 as indicated by the preliminary energy ratings.	Planning scheme clause 55.07-1 / 58.03-1

General insulation comments	Insulation installed in residential dwellings will meet minimum BCA requirements as appropriate to meet 6 star energy ratings.	BCA Part 3.12 / Part J
Building sealing	Building sealing will be in accordance with NCC 2019 Part 3.12.3 *Building Sealing*	Part J
	No power data points etc. will be installed on external walls where insulation removal for electrical safety would compromise the external wall envelope. Alternatively, if installed, acoustic fire rated wall boxes will be installed behind these power and data points.	Additional sustainability practice
	Insulation between all windows and wall frames behind architraves will be inspected during an additional inspection by the building surveyor and confirmed before internal plaster lining is fitted.	Additional sustainability practice
Heating and cooling	Heating and cooling will be efficient electric inverter reverse cycle air-conditioners and selected to be within 1 star of the best available system on the market of relevant size/capacity.	SDAPP - Energy efficiency / BESS tool
Windows	Windows will be double glazing throughout the development. For more details on windows see IEQ natural ventilation in this report.	NCC-BCA Section J, NatHERS
Natural ventilation	Where provided, one window or sliding door included on each elevation to each habitable room will be openable to provide natural ventilation and reduce the need for mechanical cooling. The openable component is to be shown on the plans.	Additional sustainability practice
Downlights	Downlights will be LED IC rated (Insulation Contact) type, running cooler and allowing for insulation to be directly installed over the downlight fitting itself (as per manufacturer's instructions). This will reduce the heat losses and gains through gaps in ceiling insulations. IC rated products are available at comparative prices to non-IC rated LED downlights. Current LED downlights consume approximately 10-15% of the energy and provide as good or better light output than halogen type.	Additional sustainability practice
Lighting	Lighting density throughout the development will be reduced to at least 20% below the maximum allowed by the BCA 2019 (e.g.	BCA Part J6 – Additional

	• 4W/m2 rather than 5W/m2 for dwellings • 4W/m2 rather than 5W/m2 for common areas such as corridors). Good LED residential downlights at 6W now provide better lighting output than 50W halogens so generally make this target easy to achieve. Motion sensors will be included in lighting circuits to storerooms and common areas.	sustainability practice
External lighting	External lighting to paths and driveways/carparks will have a daylight sensor and either timer or motion sensors installed.	BCA Part J6
Energy efficient lifts	Energy efficient lifts will be installed i.e. lifts where motors become alternators as the lift descends. Otis and Kone both offer lift ranges where a regenerative drive comes standard.	SDS tool
Clothes drying facilities	Each ground floor dwellings will incorporate a outdoor clothes drying line.	BESS tool
Individual metering of services	Electricity will be individually metered for each dwelling ensuring energy saving behaviour is rewarded.	Additional sustainability practice
Solar PV	Solar photovoltaic (PV) panels of minimum 10kW total capacity will be installed to supply power to the development. If facing north at a 10° angle from horizontal plane (appropriate minimum angle on flat roofs to ensure self-cleaning) this system is expected to generate approximately 12500 kWh/year.	BESS tool

Additional Details

Reduce the reliance on gas to the building	In the last year 32.8% of Victoria's grid electricity came from renewable electricity[6]. By 2025 this will be 40%, and 50% by 2030[7]. All electric services and appliances will automatically become greener due to the greening of the electricity network, and where renewable energy is generated on site or purchased from offsite, there is the opportunity for the development to easily become carbon neutral in its energy consumption. Carbon neutrality in energy consumption is not difficult to achieve. Natural gas on the other hand is methane and produces carbon dioxide – a greenhouse gas - when burned in heating, hot water or

[6] OpenNEM https://opennem.org.au/energy/vic1/?range=1y&interval=1M
[7] Victorian Government legislated Renewable Energy (Jobs and Investment) Act 2017 https://www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets

cooking. While trials are occurring for introducing clean burning hydrogen gas into our network, which produces no carbon emissions when burned, no clear path is confirmed on how and when all of the network could deliver beyond 10% hydrogen.

Preview energy ratings

The energy efficiency rating of a development is directly affected by the passive solar design characteristics of dwellings which include the orientation of the residences, windows, window sizes, shading of windows; and also the levels of insulation, window type selected (i.e. single or double glazing with standard or insulated frames) and thermal mass levels within the space. These elements will be combined in such a way to ensure the residences achieve the required 6 star energy efficiency.

A sample of 13 dwellings (see below) indicates that the development can readily achieve an average energy rating of 6.6 stars. Dwellings were selected to provide a representation of similar or likely lower performing similar dwellings.

Thermal Group	Apartment Modelled	No. of similar/better performing apartments	Similar or better performing apartments	Cooling Load (MJ/m^2)	Star Rating
1	G.01	10	G.06, 1.01, 1.06, 2.01, 2.06, 3.01, 3.04, 4.01, 4.02	7.5	6.8
2	G.02	14	G.03, G.04, G.05, 1.02, 1.03, 1.04, 1.05, 2.02, 2.03, 2.04, 2.05, 3.02, 3.03	8.0	6.8
3	G.10	4	G.15, 1.10, 1.15	9.8	6.2
4	G.11	4	G.14, 1.11, 1.14	21.0	5.9
5	G.12	8	G.13, 1.12, 1.13, 2.10, 2.11, 3.08, 3.09	8.0	6.3
6	G.16	6	G.09, 1.16, 1.09, 2.08, 3.06	12.2	6.1
7	G.17	12	G.07, G.08, G.18, 1.07, 1.08, 1.17, 1.18, 2.15, 2.07, 3.05, 3.12	12.5	6.8
8	2.12	4	2.09, 3.10, 3.07	11.2	6.4
9	2.13	1		12.3	8.1
10	2.14	1		12.1	7.8
11	3.11	1		20.7	6.7
12	4.05	2	4.04	14.1	6.7
13	4.06	2	4.03	20.0	7.1
				Average star rating	6.6

These ratings were based on the following assumptions:

- Roof/ceiling insulation: R4.0 added insulation with single side foil when exposed to outside air above.
- External wall insulation: R2.0 added insulation with airgap
- Internal wall insulation: R1.0 added insulation to internal wall frames between conditioned and non-conditioned spaces
- Windows:
    - G.10 – Thermally broken aluminium double glazed frame, air filled gap, clear (U-value = 3.6, SHGC = 0.54)
    - Others - Aluminium double glazed frame, air filled gap, clear (U-value = 4.8, SHGC = 0.59)
- More assumptions are included in Appendix 2.

Preview ratings on sampled dwellings indicate that a combination of both increased wall insulation values above R2.0 and improved glazing may be required for all dwellings to achieve the minimum

	energy rating of 5 star minimum, 6 stars average and BADS maximum cooling load allowances (to be confirmed when undertaking final energy performance ratings).
Maximum Cooling Loads	The proposed development commits to achieving the maximum cooling load for the climate zone '62 - Moorabbin Airport' of 21MJ/m^2 per annum per clause '55.07-1 Energy Efficiency'. Cooling loads for each dwelling will be assessed during the building certification energy ratings and adjusted as appropriate. Should a reduction in a dwelling cooling loads be required there is potential for this development to adapt through the specification of higher performing glazing and/or improved local shading as appropriate. Further information is contained within the appendices.
Building sealing	Building sealing prevents un-intended air movement through the thermal envelope (infiltration and exfiltration). Air gaps in the building fabric result is uncontrolled heating and cooling demands in addition to high risk of structural damage due to condensation internally in well insulated envelope walls. It is important to ensure air-tight connections between internal lining on exterior walls, ceiling and floor plate, around electrical and hydraulic penetrations going through the air-tight barrier by using a system of grommets, membranes and tapes. Alternatively a combination of plasterboard and caulking with high level attention to detail can make a large difference to the air leakage rate of the building. To address air leakage through doors and windows, the following measures are recommended. Compressible foam or similar seals provided around doorways from conditioned to non-conditioned spaces, draft protection devices along the bottom edge of external swing doors, multi-fit cable and pipe seals/adhesive membrane grommets for sealing around pipes or conduits passing through the building envelope, and exhaust fans will have self-closing dampers fitted. Building sealing prevents un-intended heat gain or heat loss.
Equivalent annual COP/EER	Star rating is voluntary for 3 phase air-conditioning systems, the below table provides the equivalent annual coefficient of performance and/or energy efficiency ratio

Star rating	ACOP/AEER
1.0	2.75
1.5	3.00
2.0	3.25
2.5	3.50
3.0	3.75
3.5	4.00
4.0	4.25
4.5	4.50
5.0	4.75
5.5	5.00
6.0	5.25

Heating and cooling

Heating and cooling will be provided by reverse cycle air-conditioner units (which incorporate heat pump technology).

Split system air-conditioning/heat pump unit sizes typically range from a 2.5kW unit to cool or heat one bedroom only, to a 5-6kW unit to cool or heat a one bedroom apartment, to 7-10kW or multiple units to cool or heat larger apartments or living areas of dwellings.

Multi-head split system units or ducted and concealed unit air-conditioning/heat pump units are often chosen for townhouses and range from 10kW to <19kW in size.

Air-conditioners will be reviewed against the following government website to confirm their performance prior to specification. For simple availability checking use the Basic search.
https://reg.energyrating.gov.au/comparator/product_types/64/search/

Windows

When selecting a window system, attention must be paid to all components of the system, not just the average thermal values of the glass.

Framing material with low thermal conductivity must be selected to ensure the internal surface of the frame remains at a temperature higher than dew point of the indoor air in winter.

The spacer material between the glass panes must also be detailed in a material with low thermal conductivity to ensure the temperature along the edge of the glazing does not drop below dew point.

If such details are not in place, condensation will form on the internal side of the frames in winter. This will provide good growing conditions for mould and is likely to damage the construction.

Downlights

Previously, downlights were installed with clearances around the fitting leaving gaps in the ceiling insulation. This created a point for undesirable heat losses and gains to occur. By installing IC rated

downlights, the insulation can be installed without interruption over the downlight.

Example stockists include:

- **Beacon Lighting** Commercial (Victorian head office: 8415 0277 or visit http://www.beaconlightingcommercial.com.au/lighting/lighting-tips-1/ic-rating.html). LEDlux models City, Comparda, Element, Infinity and Tone models are IC rated.
- **Rexel Electrical** (Melbourne CBD store: 9670 5522). Atom lighting models AT9012, AT9015, AT9016, AT9020, AT9021, AT9022, AT9027 are IC rated. For technical information, contact Atom lighting head office on (07) 5537 1022
- **Cetnaj** (South Melbourne Store: 8632 3100). SAL Sunny Australia Lighting: The Ecogem S9041 model is IC rated and able to be covered by insulation.
- **Bunnings** (Victorian head office: 8831 9777 or visit www.bunnings.com.au). Select Deta LED Downlights rated as IC abutted and covered.

Energy efficient lifts

Energy efficient lifts will be installed with some of the following measures:

- Traction lifts installed rather than hydraulic lift: Traction lifts are often 5-20 times more efficient but 10% - 20% more expensive than a hydraulic lift servicing the same amount of floors. They are also faster and more reliable best suiting a high traffic flow. Many traction lifts use between 5 and 10kW, where the hydraulic lifts are between 25 - 30kw. Actual efficiency varies and depends on loads and travel distance. A traction lift at between 40 and 60% of its rated load is 5 - 20 times more efficient than a hydraulic lift with the same load.
- Have regenerative drives: Lifts where motors will be recharged as the lift descends. Otis and Kone both offer lift ranges where a regenerative drive comes standard. In-cabin sensors and software that automatically enter a sleep mode, turning off lights, ventilation fans, music, and displays when unoccupied.
- The lift will have software and microprocessor based controls instead of electromechanical relay.
- The lift will not require the provision of a machine room
- The lift will be fitted with adjustable speed motors
- It will include a suspension system that is specifically designed to reduce friction and gearless or plant drive gears to reduce drive losses.

A useful contact can be Ned Savic at www.1300elevators.com.au

Alternative energy source Solar PV panels

Solar panels will be installed to supply power for lighting the common space areas. A minimum 10kW system will be installed to cover an efficient lighting design, based on the following allowances. Note other design parameters might produce more efficient lighting levels.

3 Indoor Environment Quality

Background

Access to daylight and sunshine is advantageous to the wellbeing of humans.

Many paints, adhesives, sealants and flooring types contain Volatile Organic Compounds (VOCs) which are released into the air in our homes. Joinery has, over the last 30 years, contained high levels of formaldehyde. VOCs and formaldehyde are recognised as potentially harmful to humans as well as contributors to atmospheric pollution.

Goals

- To achieve a healthy indoor environment quality for the wellbeing of building occupants, including the provision of fresh air intake, cross ventilation and natural daylight.
- To achieve thermal comfort levels with minimised need for mechanical heating, ventilation and cooling.
- To reduce indoor air pollutants by encouraging use of materials with low toxic chemicals levels.
- To minimise noise levels and noise transfer within and between buildings and associated external areas.

Initiatives

Natural ventilation	Dwelling windows will meet or exceed BCA minimum 5% room area allowance. The openable component of is to be shown on the plans.	BCA requirement
	All dwelling habitable room windows will include an openable component.	Additional sustainability practice
	34% of apartments meet the requirements of BESS IEQ 2.1 effective natural ventilation	BESS IEQ 2.1
	There are no habitable rooms with borrowed ventilation.	SDAPP - IEQ
	All ground and first floor openable windows will incorporate or have locks fitted to allow windows to be locked open at night safely allowing overnight ventilation.	Additional sustainability practice
	Hinged doors to habitable rooms will have mechanical or magnetic door catches to keep doors open and enable natural (cross)ventilation between rooms.	BESS tool
Daylight	Windows that have an aggregate light transmitting area measured exclusive of framing members, glazing bars or other obstructions of not less than 10% of the floor area of the room must be provided.	NCC-BCA Section F

	All rooms have 2.7m ceilings and there is 2.4m high glazing to living room to maximise daylight ingress.	Additional sustainability practice
	Light coloured walls internally will help to maximise daylight levels.	Additional sustainability practice
Glare (external sources)	Internal blinds will be installed to manage glare rather than rely on tinted glass.	Green Star - Visual Comfort
Low VOC products	Paints and adhesives will be low volatile organic compounds (VOC) types or water based. Carpets will be low VOC and comply with the limits as outlined in additional details. Contractors are required to provide evidence of these.	Green Star / BESS tool
Low formaldehyde products	Engineered wood products (including MDF, particleboard and plywood) will be Class E1 formaldehyde or better. Formaldehyde is used in the production of resins that act as glues for engineered wood products and is a colourless gas with a strong odour. Exposure to formaldehyde can cause irritation in the eyes, nose and throat with various authorities recommend E1 as a maximum emissions class.	Green Star
Green painters quote	A quote will be obtained from accredited green painters on this job - sourced from www.greenpainters.com.au	Additional sustainability practice

Additional details

Ventilation paths	Suppliers of mechanical or magnetic door latch stops that can keep doors open include: Gainsborough, Architect and Scope and Bellvue Imports.
Low VOC	Volatile Organic Compounds is the term used to describe several hundred petrochemical solvent type compounds found in paints, adhesives, sealants, carpets, reconstituted wood products, and new furniture. Newer buildings generally have higher concentrations of these VOC's that contribute to headache, lethargy etc. in occupants. **Low VOC paints, adhesives and sealants –** the VOC content of paints, adhesives and sealants will not exceed the levels listed in the table below (VOC limits are less water and exempt compounds) (from the Green Star Design and As Built v1.1 guidelines). Low VOC adhesives and sealants are readily available and can be purchased in bulk to minimise the price premium. Mapei adhesives offer a full low VOC adhesives range.

Product category	Maximum VOC content (g/litre)
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One & two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membrane and sealant, fire retardant sealant and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesive and sealants	100

Low VOC paints are readily available at all suppliers:

- Wattyl ID Eco System Low VOC
- Haymes - www.haymespaint.com.au
- Porters Paints - www.porterspaints.com
- Bio Products Aust - www.bioproducts.com.au
- Ecolor - www.ecolour.com.au
- Livos - www.livos.com.au
- Murobond - www.murobond.com.au
- Oikos non toxic Paints - http://www.nontoxicpaint.com.au
- The Natural Paint Company - www.naturalpaint.com. au

Low VOC carpets – the VOC content of carpets will not exceed the levels listed in the table below in accordance with the relevant test protocols (from Green Star Design and As Built v1.1 guidelines).

Test protocol	Limit
ASTM D5116 – Total VOC limit	0.5mg/m² per hour
ASTM D5116 – 4-PC (4-Phenylcyclohexene)	0.05mg/m² per hour
ISO 16000/EN13419 – TVOC at three days	0.5mg/m² per hour
ISO 10580 / ISO/TC 219 (document N238) – TVOC at 24 hours	0.5mg/m² per hour

Low formaldehyde products

Reduced formaldehyde emissions in engineered wood products are classed as below:

Class	Limits (mg/L)
Super E0	Less than or equal to 0.3
E0	Less than or equal to 0.5
E1	Less than or equal to 1.0
E2	Less than or equal to 2.0
E3	Greater than 2.0

Companies offering low formaldehyde engineered wood products include:

- Polytec offers E1 and E0.
- Nikpol offers E1, E0 and Super E0 for select products.
- Austral Plywood E1, E0 and Super E0 for select products.
- Laminex Australia offer E1, E0, Super E0 and no added formaldehyde for select products.

4 Water Conservation

Background

As populations increase and global warming contributes to fast climate change, the access to clean potable water will become more of an issue to Australians and the world. Inefficient use of water can lead to the destruction of habitat for dams, over-use of artesian water supplies creating a rising water table or intensive energy use for desalination plants.

Goals

- To ensure the efficient use of water.
- To reduce total operating potable water use.
- To encourage the collection and re-use of stormwater
- To encourage the appropriate use of alternative water sources.
- To minimise associated water costs.

Initiatives

Water efficient fixtures, fittings and appliances	Water efficient fixtures, fittings and appliances have been selected in line with the following WELS ratings: • 4 star shower (6-7.5L/min) • 4 star toilets • 5 star bathroom taps • 5 star kitchen taps	BESS, Green Star
Rainwater collection and use	Rainwater collection and use will involve the installation of two rainwater tanks of minimum 8,000L capacity each, collecting water from all roof areas and supplying it to all toilets in the development.	STORM, BESS tool, Green Star
Accessibility of pumps	Water pumps and manual over-ride switches will be readily accessible for access in the event of malfunction.	Additional sustainability practice
Individual metering of water	Water will be individually metered for each dwelling, ensuring water saving behaviour is rewarded.	SDAPP – Water efficiency, BESS tool

Water efficient landscaping	Proposed planting will be water efficient and will not require watering after an initial period when plants are getting established. Therefore, no irrigation system is proposed.	BESS tool

Additional details

Water efficient fixtures & fittings	All fittings to be specified are based on recommendations from www.savewater.com.au or from the product search on the following site www.waterrating.gov.au and will be amongst the most efficient on the market, and a significant improvement on fittings historically used in most buildings. Traditionally shower heads would use more than 16 litres of water per minute. One star shower heads use between 12 – 16 litres per minute, 2 star shower heads use between 9-12 litres per minute. To reduce this to 6-7.5 litres per minute with a 4 star shower head is a significant improvement. Further water efficient appliances will be determined from sources such as the following web site http://www.waterrating.gov.au.

5 Stormwater Management

Background

Pollutants that build up on impervious surfaces get washed into the stormwater system and end up in local waterways. Water Sensitive Urban Design is now a major goal of urban development to prevent this occurring.

The quality of water leaving a site (and peak and total stormwater run-off volumes) can be improved by collection of water in water tanks, natural infiltration through gardens and lawns into the soils, and minimisation of impervious pavements or the shedding of water from impervious surfaces into garden beds that have particularly good infiltration into the ground – known as infiltration beds. The following measures have been adopted to ensure these concerns are addressed.

Goals

- To reduce the impact of stormwater run-off
- To improve the quality of stormwater run-off
- To achieve best practice stormwater quality outcomes
- To incorporate the use of water sensitive urban design, including stormwater re-use

Initiatives

Best Practice Stormwater treatment	The following is proposed to achieve 106% of Melbourne Water STORM calculator Best Practice Stormwater treatment goals: • West roof areas (minimum 613m^2) will be collected in a rainwater tank of 8,000L capacity.	STORM, Planning scheme clause 53.18-5, 58.03-8

	• East roof areas (minimum 415m^2) will be collected in another rainwater tank of 8,000L capacity. • Leaf diverting rain heads and first flush diverters will be included upstream of the tank to divert the initial sediment flow when rain events occur from entering the tank. • Rainwater tanks will be connected to all toilets within the development serving all toilets for flushing purposes. • Balconies have been excluded from rainwater collection areas, as these typically contain more rubbish and other contaminants (eg. food scraps, cigarette butts, cleaning products). • Paved paths will shed water to adjoining soft landscaped areas allowing ground infiltration via a buffer strip. • Green roofs are effective stormwater treatment strategies as they can filter, store, and evaporate rainwater, reducing runoff and improving stormwater quality. Therefore, green roofs will be considered as raingardens for the STORM Assessment (appendix 5). • The green roof will treat the rainwater collected on the rooftop area. • Northern roofs and balconies will collect rainwater into the smaller green roofs in the façade. • The plants and filter media should physically, chemically and biologically remove pollutants from the water. The filter media may include scoria, screenings or loamy sand. Water takes longer to infiltrate in clay soils than sandy soils.	

Additional details

Water sensitive urban design - rainwater tanks	The proposed rainwater tank collection system provides benefits of reducing the peak and total stormwater run-off when it rains. Since the water tanks are connected to all of the toilets, the tank water volumes are run down regularly. This leaves spare capacity to collect new rainfall water and hence reduces the level of rain from the roofs going down the drains. In addition, the pollutants leaving the site to the stormwater system (and hence local creeks) is reduced, by water collected off the roofs, going via the toilets into the sewer system rather than stormwater system as would otherwise have been the case. The final design of the Stormwater system will meet council drainage engineers' requirements. The designed system complies with Melbourne Water STORM requirements ie meets Victorian Best Practice Stormwater guidelines – see appendix 5.

6 Material Selection

Background

Careful selection of construction materials can help to limit the environmental impacts of the production, transport and incorporation of these materials in our buildings. In many cases there are similarly performing, comparable but more environmentally friendly product selection options available.

Goals

The goals in environmentally sustainable construction material selection should be to:

- Limit the use of new materials where possible - to help minimise the detrimental outcomes of product manufacture or modification
- Select durable materials and re-use materials where possible – increase the lifespan of all products.
- To minimise the environmental impacts materials used by encouraging the use of materials with a favourable lifecycle assessment based on the fate of materials, their recycling / reuse potential, their embodied energy, their biodiversity, human health, and environmental toxicity impacts.

Initiatives

Greener concrete mixes	Supplementary Cement materials (SCMs)- slag and/or flyash will partially substitute carbon intensive Portland cement in concrete mixes. 20-35% slag and/or flyash or similar geopolymer mixes will be incorporated in on-site on-ground poured structural and paving concrete mixes where vehicles will not be regularly driving over the concrete subject to structural engineers approval.	SDAPP / Green Star
Greener aggregate options	50% recycled aggregate or recycled glass sand will be used as sub-base under paths and or roads subject to design engineer's approval.	Additional sustainability practice
Greener pipe bedding options	100% recycled glass sand will be used for pipe bedding (plumbing pipe, electrical cable etc) In preference to mined virgin sand, subject to the design engineer's approval.	Additional sustainability practice
Light coloured paving	Paving will be light in colour to reduce solar absorption and mitigate the addition to the urban heat island effect. The alternative, dark pavers, would absorb more heat and potentially provides a hotter localised micro-climate on hot days.	Additional sustainability practice
Light coloured roofing	The building roof colour is to be light – medium colour (as per the BCA definitions) rather than dark to help mitigate the effects of the Urban Heat Island effect.	Additional sustainability practice

	The Colorbond colour range lists the Solar Absorptance values and categorises the colours into light, medium and dark (L, M, D) within their brochures.	
Sustainable timbers	No unsustainable rainforest timbers will be incorporated i.e. no Oregon, Western Red Cedar, Meranti, Merbau, Teak or Luan.	Green Star
Glasswool insulation	Where glasswool insulation is to be used, a product with greater than 50% recycled glass and without the use of formaldehyde as a binder (such as Earthwool or Green Tag certified CSR Bradford Gold batts) will be used.	Additional sustainability practice
Carpet underlay	Where carpet is installed, underlay with recycled content will be used under carpets Alternatively, a carpet underlay that is third party GECA certified will be used (e.g. Cloudwalk carpet cushion range).	Additional sustainability practice

Additional details

Partial cement replacement in concrete	Cement production is the single biggest industrial producer of greenhouse gas generating emissions. Cement production causes 8% of global emissions – more than the global car fleet. (*From page7 of the BZE Rethinking Cement report which references International Energy Agency 2015. Various data sources http://www.iea.org/statistics/).* The industry standard cement type has been Portland cement, for which the raw material is limestone. The first stage of cement making is to transform limestone (calcium carbonate - CaCO3) into lime (CaO), thus releasing carbon dioxide (CO2) a Greenhouse Gas as a waste product. This single process accounts for about half of the carbon emissions associated with cement making, and therefore around 4% of the world's total emissions. The rest comes from the heat required to drive the production processes and the energy to grind and transport material. Alternative supplementary cementious materials (SCM) concrete mixes have a complying strength, are a similar price and use a reduced amount of high greenhouse gas producing Portland cement when compared with standard cement mixes. They also incorporate the recycling of industrial waste products such as fly ash and slag and reduce the amount of raw resources required to produce the end product. Embodied energy levels:

Concrete Product	Embodied carbon TCO2-e/m3	Emboddied carbon as a percentage of OPC 32MPA
Generic 32MPA Ordinary Portland Cement	0.481	100%
With 20% flyash	0.397	82.5%
With 20% blast furnace slag	0.404	84.0 %
With 50% flyash	0.273	56.8%
With 50% blast furnace slag	0.288	60.0%
With 100% slag or flyash geopolymer replacement (must be structurally approved. Suitable for some applications)	0.120	25.0%
Holcim EcoPact (lowest non geopolymer we are aware of)	0.198	41.1%
Holcim EcoPact Zero (ECOPact with carbon offset)	0.028	5.8%

Source – The Green Book

Suppliers of geopolymer – Supplementary Cementitious Materials cement:

Company	Product	Contact
Hansen Concrete	Ask for the **Green Star mix**. Common mixes include 30-50% fly ash/slag component	Bob Aldersy 03 9274 3700 Kevin Skilling 9570 3244 Dave Miller 0418 548 321
Boral Concrete	**Envirocrete** **Envirocrete Plus** **Envisia**	Office 13 30 06 Tania Neil 0401 892 027
Barro Concrete	**Triple blend mix** is the fly ash/slag/cement mix - generally has 20-35% fly ash and/or slag	Tom Kovaks 9646 5520 Piero 0438 181 681
Holcim	**ECOPact** Low carbon concrete range offers between 30-60% reduction on embodied carbon. ECOPact ZERO is a full 100% Carbon Neutral product where ECOPact concrete mix is used and emissions are offset with a certified eligible carbon offset through the Climate Active program.	Dylan Viviers 0429 790 600

Greener aggregate options

Recycled rock is cheaper than virgin quarry product and less product is required for a job, hence also reducing the transport emissions.

100% recycled rock is able to be used in road and path sub-base and per Alex Frasers advice can constitute up to 65% saving on embodied emissions depending on the distance of transport from plant to site.

Greener pipe bedding options

Recycled glass sand is competitively priced with beach sand and has OHS benefits as the grains are larger and have lower potential to cause health issues compared to virgin sand.

Alex Fraser have sites in Laverton, Epping and Dandenong to supply this product Melbourne wide.

Light coloured paving

Light coloured paving has a low solar absorptance per below. Alternatively it has a high Solar Reflective Index (SRI) of 39 minimum initial value or 34 as a three year value (from the Green Star Design and As Built Credit 25 criteria).

Note typical initial SRI values are:

Description	SRI
Grey concrete 35	35
White concrete 86	86
Standard white paint 100	100
Standard black paint 5	5
New asphalt 0	0

Light coloured roofing

The Colorbond colour range noted below can inform solar absorptance values of different finishes for metal roof construction.

https://colorbond.com/sites/default/files/pdf/brochures/colorbond_steel_colours_for_your_home_colour_chart.pdf

Carpet underlay

Carpet underlay with significant recycled content (per above) or other environmental benefits will be used.

Suggested recycled underlay products include:

- **Dunlop flooring -** http://www.dunlopflooring.com.au/sustainability/recycle-by-dunlop.asp
- **Airstep carpet underlay -** http://www.airstep.com.au/environmental-overview/recycling/
- **Cloudwalk carpet cushion -** http:// cloudwalk.com.au/product-category/carpet-cushion/

The Cloudwalk carpet cushion range of underlay is third party GECA certified – it has very low VOC emissions avoids toxic or hazardous chemicals in the manufacturing and the underlays are fully recyclable if the user drops them off at Cloudwalk (TBC if collections also occur in Victoria). Their manufacturing processes are also ISO9001 Quality Management System and ISO14001 Environmental Management System certified.

7 Location and Transport

Goals

- To ensure that the built environment is designed to promote the use of walking, cycling and public transport in that order.
- To minimise car dependency
- To promote the use of low emission vehicle technologies and supporting infrastructure

Location

The location of this development meets urban consolidation goals as set out in government policy documents. The development is relatively close to public transport and facilities.

The location achieves a **Walk Score** of **87** which is considered **very walkable**.

Initiatives

Green travel plan	The Local Area Map in appendices will be displayed in the foyer of the development along with a notification reminder that the Google Maps cycling filter indicates where off road bike trails well as dedicated bike lanes are located.	Green travel plan
Bicycle paths	The development is located approximately 2.7km from the Dandenong Creek Trail.	Additional sustainability practice
Bicycle parking	The proposed development includes the provision of 26 formal allocated bicycle parking spaces located in the basement carpark, for both visitors and residents and 6 outdoor bicycle parking on ground floor. Additional bicycles can be stored in the private open space (POS) attached to each dwelling, or within dwellings or garages via the use of ceiling mounted bicycle storage hoists. This number of bicycles exceeds the requirements of the Planning scheme which requires a total of 14 residential and 7 visitor spaces. This allocation supports promoting the use of sustainable personal transport and is especially relevant given the suitable location of the development.	Planning Scheme clause 52.34 / SDAPP – Transport / BESS
Local public transport information packs	Relevant local train, tram and bus timetables will be included in the Building Users Guide provided. Also included will be brief details of the Melbourne myki public transport payment card system including how to register and load funds against a myki card.	SDAPP - Transport

	Occupants will be alerted to the existence of various public transport smartphone apps such as the Public Transport Victoria app and/or train or tram tracker	
Public transport	The proposed location is serviced by the following public transport options: • Train – 900 metres from the site • Bus – 60 metres from the site These are able to be viewed on the public transport Local Area Map attached in the appendices.	Additional sustainability practice
Electric vehicle charging - apartments	To facilitate future zero carbon emissions vehicle transport (in addition to near net zero carbon emissions operational energy in the development) the site will be electric vehicle (EV) capable. The developer will install the base skeleton of EV infrastructure ie an EV charging distribution board with capacity for a 30-32Amp circuit to all car parking spaces and cable tray to near parking bays. This will allow residents to provide their own chargers and cabling back to the distribution board should they wish to charge an electric vehicle. The owners corporation will specify a load management and metering system for managing charging within the development during off peak times such that the total load on the building does not exceed loads without EV charging (this assumes EVs are only guaranteed 12kWh or charging per evening).	Additional sustainability practice

Additional details

Green travel plan	Green travel options are dependent on the following factors: • Location of the site • Walking distance of facilities • Cycling facilities – paths and parking • Public transport facilities • Parking facilities for other motorised vehicles
Bicycle paths	Principal Bicycle Network (PBN) routes for each council area are available via the following link https://www.vicroads.vic.gov.au/traffic-and-road-use/cycling/bicycle-network-planning Strategic Cycling Corridors (SCCs) are a recent addition to bicycle network planning in metropolitan Melbourne. Identification of SCCs is part of the initiative in Plan Melbourne to 'Support Walking and

	Cycling in Central Melbourne'. They are corridors developed to improve cycling to an around major activity centres in metropolitan Melbourne. SCCs are a subset of the PBN.
Bicycle parking/storage	Our cities are on the cusp of a significant uptake in the use of electric versions of bicycles and scooters. These electric incarnations are ideal for short trips to connect with public transport, and their use will boost the demand for bicycle parking rails and appropriate scooter locker storage.
Public transport	Tram, bus and train timetables can be accessed from http://ptv.vic.gov.au/timetables/ A full range of Public Transport Victoria maps can be sourced from http://ptv.vic.gov.au/getting-around/maps/ For more train specific information visit www.metrotrains.com.au A Travel Smart map showing major local travel interchanges can be obtained for the councils listed on the site http://www.transport.vic.gov.au/projects/travelsmart/maps
Electric vehicle charging	Moreland City Council has recently published the **Moreland Zero Carbon Development Guidelines – Electric Vehicle Infrastructure**. This guideline provides good background and technical advice for installing EV infrastructure in townhouses and apartments. The installation of EV charging infrastructure (EV Supply Equipment - EVSE) is cheaper and neater at the time of construction instead of retrofitting. For townhouses, cables can be concealed in the wall without damaging the wall to do this. For apartments once the distribution board and cable tray or conduit is provided by the development, it is simpler and significantly cheaper for residents with EVs to install electrical cabling to, and a charger at, their own car park, at their own cost. The cost of electric chargers is typically $700 - $1500 per station (refer to www.evse.com.au or similar). **Volts (V) x Current (Amps) = Power (kW).** The more Amps that can be supplied to a car the faster it will charge. Typical power circuits to power points supply 10 or 15Amps but 30-32Amps can be supplied in single phase buildings. Where three phase power is supplied, higher rates of power can be supplied for faster charging. The charging speed of cars is reported in the power supply to that car. The greater the power supply, the greater the power input and range delivered per charge hour For example 10Amp outlet at 240V delivering 2.4kW of power – approx. 9km/hr 15Amp outlet at 240V delivering 3.6kW of power – approx. 15km/hr

30Amp outlet at 240V delivering 7.2kW of power – approx. 30km/hr

EVs can be charged on economy electricity tariffs, so owners can save money if an economy (eg overnight) tariff is used for off peak charging. If you charge from a solar PV system, recharge costs can be further reduced with the added benefit of no CO2 emissions from this renewable energy source.

Please note: An EV charging point set up by the electrical contractor must comply with the relevant Australian Standards and state specific requirements.

The My Electric Car calculator http://myelectriccar.com.au/calculator/ details potential fuel savings in switching to an EV.

Information generally taken from https://www.ergon.com.au/network/manage-your-energy/electric-vehicles/charging-your-electric-vehicle

8 Waste Management

Goals

- To promote waste avoidance, re-use and recycling during the design, construction and operation stages of development.
- To ensure durability and long term re-usability of building materials.
- To ensure sufficient space is allocated for future change in waste management needs, including (where possible) composting and green waste facilities.

Initiatives

Demolition stage	The developer has committed to ensuring the demolition contractor recycles a minimum of 80% of materials from the existing building to be demolished. The demolition contractor will be required to identify in advance what materials will be recycled, and confirm in writing on company letterhead the percentage of materials by mass actually recycled on completion of works.	SDAPP - Waste
Removal of refrigerant from decommissioned air-conditioning units	Before disposing of air conditioners, all units are to have the refrigerant 'recovered' by a licensed Australian Refrigeration Council (ARC) member technician. See more details below.	Additional sustainability practice
Construction waste	A minimum of 80% of materials will be recycled during construction.	SDAPP - Waste

	Written documentation required from contractor(s) in advance on company letterhead confirming items to be recycled, and on completion, confirmation of percentage of materials recycled.	
Plastering waste	The plastering contractor will be required to supply their own bin and recycle plasterboard off-cuts.	Additional sustainability practice
Separate waste stream collection	Space is allowed within each dwelling for storage of separate garbage and recycling bins. A Waste Management Plan will allow for waste collections for the whole development.	SDAPP - Waste

Additional details

Early Online marketplace sales

Use online marketplace for readily removed items

1. Gumtree for free advertising of items for collection or sale http://www.gumtree.com.au/s-home-garden/c18397 -
2. Freecycle https://www.freecycle.org/
3. Ziilch http://au.ziilch.com/

Recyclable materials

The following materials can generally be recycled:

- Bricks
- Concrete products (ie. Blocks, roof tiles, pavers etc)
- Unpainted or treated timber
- Steel / metal products
- Glass
- Plasterboard
- Plastics
- Carpet underlay
- Carpet tiles
- Asphalt
- Cardboard
- Green waste

Bin companies or similar that recycle more than others include:

- Jobsite Recyclers. http://www.jobsiterecyclers.com.au/
- Mobius Waste http://www.mobiusmr.com.au/
- Eastern Recycling www.easternrecycling.com.au
- BinGo Industries www.bingoindustries.com.au

Plastering (recycling)

Bins are available from plasterboard recyclers such as ecoGypsum (http://www.ecogypsum.com.au/collections.html) or Sunshine Groupe http://www.sunshinegroupe.com.au/. Alternatively contact recycling companies such as T&L recycling on 0407 867 133 or similar firms.

Removal of refrigerant from decommissioned air-conditioning units	Air-conditioners on site to be decommissioned are likely to have CFC (ChloroFluouroCarbons), HCFC (HydroChloroFluouroCarbons) or HFC (HydroFluouroCarbons) as the refrigerant. These refrigerants are either very harmful to the ozone layer or very significant greenhouse gas contributors. If units are not disposed of properly, refrigerant may escape into the atmosphere, contributing significantly to global warming. CFC and HCFCs have been banned for a while now. The alternative, HFCs are being gradually phased out. The federal government has started to cap the amount of refrigerant using HFCs that enters Australia as a start to outlawing such refrigerants including the common R-410A. http://www.environment.gov.au/protection/ozone/hfc-phase-down/hfc-phase-down-faqs Before disposing of air conditioners, all units are to have the refrigerant 'recovered' by a licensed Australian Refrigeration Council (ARC) member technician https://www.arctick.org/. ARC members must hold a Full Refrigerant and Air-conditioning (Full RAC) licence or Restricted Refrigerant Recoverer licence (RRRL). The recovered refrigerant is generally returned to a refrigerant gas retailer or wholesaler who will recycle the gas if possible. Where maintenance regimes have not used the manufacturers recommended gases or have used different gases over time, the refrigerant is less likely to be recyclable. If recycling is not possible, when enough gas is collected the retailer/wholesaler will forward the gas to the refrigerant gas product stewardship organisation Refrigerant Reclaim Australia (RRA) https://refrigerantreclaim.com.au/. RRA has a facility in Melbourne (the sole approved facility in Australia) for destroying refrigerant gases in an environmentally friendly manner. Gas is sent to this facility from all over Australia.

9 Urban Ecology

Background

Urban development has seen the destruction and displacement of plant species and in turn wildlife habitat. With new developments there is an opportunity to redress this that should be taken up. In all infill development cases there should be an improvement on the current environment.

Goals

- To protect and enhance habitat bio-diversity of the urban environment
- To encourage the retention of significant trees
- To encourage the planting of indigenous vegetation.
- To reduce CO2 in the atmosphere through increased vegetation
- Reduce the urban heat island effect by greening urban areas, buildings, transport corridors and open spaces with vegetation (cl15.02-1S)
- Encourage retention of existing vegetation and planting of new vegetation as part of development proposals (cl15.02-1S)

Initiatives

Vegetative cover	Approximately 34% of the proposed development has garden area, helping to minimise the urban heat island effect and increasing opportunities for biodiversity on site.	BESS tool
Deep soil plantings	Developments with a site area greater than 750m^2 will comply with planning scheme recommended minimum deep soil areas (see additional details below).	Planning scheme clause 55.07-4 / 58.03-5

Additional details

Deep soil plantings

Developments with a site area greater than 750m^2 will achieve the following requirements as required by the planning scheme.

Site area (m^2)	Deep soil area (% of site area)	Minimum tree provision (number and size of trees per area of deep soil)
750-1000	5% (minimum dimension of 3m)	1 small tree (6-8m) per 30m^2 deep soil
1001-1500	7.5% (minimum dimension of 3m)	1 medium tree (8-12m) per 50m^2 deep soil; or 1 large tree per 90m^2 deep soil
1501-2500	10% (minimum dimension of 6m)	1 large tree (over 12m) per 90m^2 deep soil; or 2 medium trees per 90m^2 deep soil
>2500	15% (minimum dimension of 6m)	1 large tree per 90m^2 deep soil; or 2 medium trees per 90m^2 deep soil

Note: Where an existing canopy tree over 8 metres can be retained on a lot greater than 1000m^2 without damage during the construction period, the minimum deep soil requirement is 7% of the site area.

10 Management, Innovation and Community Benefit

Goals

- To encourage design and innovation in the development, which positively influence the improved life of, and sustainability of, the building.
- To encourage a holistic and integrated design and construction process and ongoing high performance.

Initiatives

Communal open space	The communal open space area meets the requirement of clause 55.07-2 Standard B36 / clause 58.03-2 Standard D7 where developments with 40 or more dwellings should provide a minimum area of communal open space of 2.5 square metres per dwelling or 250 square metres, which ever is lesser.	Planning scheme clause
Building Users Guide	An appropriate short Building Users Guide will be provided for tenants explaining some of the sustainability features and intents of this development.	BESS / Green Star
Accessible access doors	Common area and apartment entrances will be a minimum 850mm wide opening (eg. 870mm swing door). At least 50% of apartments will have 850mm clear opening widths to the main bedroom, and a bathroom design that meets option A or B as outlined within planning scheme clause 55.07-6 / 58.05-1	Planning scheme clause 55.07-7 / 58.05-1
Stepless paths and entries	The path to the common building entries and dwellings will be ramped rather than containing steps.	Additional sustainability practice
Lift access	A lift will provide access to all floors.	Additional practice

Additional details

Building users guide	A short building user's guide might include details on: • The connection of the water tanks to the toilets • Waste minimisation and recycling strategy and arrangements within the building • Energy and water metering facilities for each dwelling, and what the readings represent

- Energy portals details from energy suppliers – can provide your energy use up to the previous day if used in conjunction with in house devices
- Energy efficient design choices and materials options that have been incorporated in this building
- Specifications for energy efficient items such as lights and plumbing fittings, and recommendation that replacements obtain or improve on these efficiency levels
- Local public transport stops and routes and timetables. Also included will be brief details of the Melbourne myki public transport payment card system including how to register and load funds against a myki card.
- Building management contact details

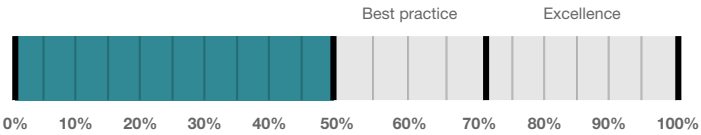
BESS Report

Built Environment Sustainability Scorecard

This BESS report outlines the sustainable design commitments of the proposed development at 718 High St Rd Glen Waverley VIC 3150. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Monash City Council.

Note that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.

Your BESS Score

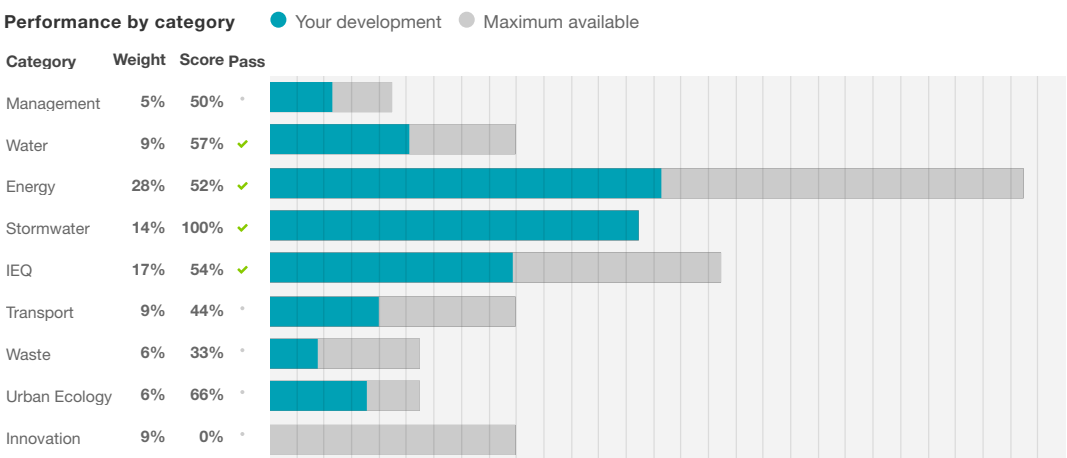


53%

Project details

Address	718 High St Rd Glen Waverley VIC 3150
Project no	3B9E4A56-R1
BESS Version	BESS-6
Site type	Multi unit development (apartment building)
Account	info@lidconsulting.com.au
Application no.	TPA/52977
Site area	3,010 m²
Building floor area	4,973.799999999999 m²
Date	23 December 2021
Software version	1.7.0-B.375

Performance by category



Buildings

Name	Height	Footprint	% of total footprint
Building 1	6	1,873 m²	100%

Dwellings & Non Res Spaces

Dwellings

Name	Quantity	Area	Building	% of total area
Apartment				
2	14	66.8 m²	Building 1	18%
7	12	67.0 m²	Building 1	16%
1	10	84.4 m²	Building 1	16%
5	8	71.7 m²	Building 1	11%
6	6	68.1 m²	Building 1	8%
3	4	92.4 m²	Building 1	7%
8	4	77.0 m²	Building 1	6%
13	2	98.2 m²	Building 1	3%
4	4	40.8 m²	Building 1	3%
12	2	67.5 m²	Building 1	2%
11	1	112 m²	Building 1	2%
10	1	70.3 m²	Building 1	1%
9	1	54.1 m²	Building 1	1%
Total	**69**	**4,973 m²**	**100%**	

Supporting information

Floorplans & elevation notes

Credit	Requirement	Response	Status
Management 3.1	Individual utility meters annotated		-
Water 3.1	Water efficient garden annotated		-
Energy 3.4	Clothes line annotated (if proposed)		-
Energy 4.2	Floor plans showing location of photovoltaic panels as described.		-
Stormwater 1.1	Location of any stormwater management systems used in STORM or MUSIC modelling (e.g. Rainwater tanks, raingarden, buffer strips)		-
IEQ 1.1	If using BESS daylight calculator, references to floorplans and elevations showing window sizes and sky angles.		-
IEQ 1.2	If using BESS daylight calculator, references to floorplans and elevations showing window sizes and sky angles.		-
IEQ 1.5	Floor plans with compliant bedrooms marked		-
Transport 1.2	All nominated residential visitor bicycle parking spaces		-
Transport 2.1	Location of electric vehicle charging infrastructure		-
Waste 2.2	Location of recycling facilities		-
Urban Ecology 1.1	Size and location of communal spaces		-
Urban Ecology 2.1	Vegetated areas		-

Credit	Requirement	Response	Status
Urban Ecology 2.2	Green roof		-

Supporting evidence

Credit	Requirement	Response	Status
Management 2.2	Preliminary NatHERS assessments		-
Energy 3.6	Provide a written description of the average lighting power density to be installed in the development and specify the lighting type(s) to be used.		-
Energy 4.2	Specifications of the solar photovoltaic system(s).		-
Stormwater 1.1	STORM report or MUSIC model		-
IEQ 1.1	If using an alternative daylight modelling program, a short report detailing assumptions used and results achieved.		-
IEQ 1.2	If using an alternative daylight modelling program, a short report detailing assumptions used and results achieved.		-
IEQ 1.5	A list of compliant bedrooms		-

Credit summary

Management Overall contribution 4.5%

50%

1.1 Pre-Application Meeting	0%
2.2 Thermal Performance Modelling - Multi-Dwelling Residential	100%
3.1 Metering	100%
3.3 Metering	0%
4.1 Building Users Guide	100%

Water Overall contribution 9.0%

Minimum required 50% **57%** ✔ **Pass**

1.1 Potable water use reduction	40%
3.1 Water Efficient Landscaping	100%
4.1 Building Systems Water Use Reduction	100%

Energy Overall contribution 27.5%

	Minimum required 50%	52%	Pass
1.2 Thermal Performance Rating - Residential		16%	
2.1 Greenhouse Gas Emissions		100%	
2.2 Peak Demand		0%	
2.3 Electricity Consumption		100%	
2.4 Gas Consumption		N/A	Scoped Out
Gas is provided only for cooking.			
3.1 Carpark Ventilation		0%	
3.2 Hot Water		100%	
3.4 Clothes Drying		100%	
3.6 Internal Lighting - Residential Multiple Dwellings		100%	
4.2 Renewable Energy Systems - Solar		100%	
4.4 Renewable Energy Systems - Other		N/A	Disabled
No other (non-solar PV) renewable energy is in use.			

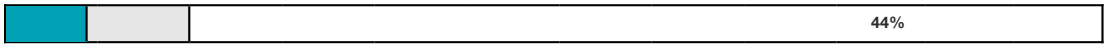
Stormwater Overall contribution 13.5%

	Minimum required 100%	100%	Pass
1.1 Stormwater Treatment		100%	

IEQ Overall contribution 16.5%

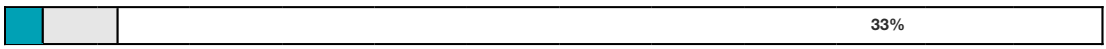
	Minimum required 50%	54%	Pass
1.1 Daylight Access - Living Areas		100%	
1.2 Daylight Access - Bedrooms		66%	
1.3 Winter Sunlight		0%	
1.5 Daylight Access - Minimal Internal Bedrooms		100%	
2.1 Effective Natural Ventilation		0%	

Transport Overall contribution 9.0%



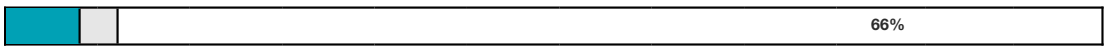
1.1 Bicycle Parking - Residential	0%
1.2 Bicycle Parking - Residential Visitor	100%
1.3 Bicycle Parking - Convenience Residential	N/A ⊘ Disabled
	Credit 1.1 must be achieved first.
2.1 Electric Vehicle Infrastructure	100%
2.2 Car Share Scheme	0%
2.3 Motorbikes / Mopeds	0%

Waste Overall contribution 5.5%



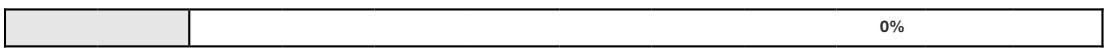
1.1 - Construction Waste - Building Re-Use	0%
2.1 - Operational Waste - Food & Garden Waste	0%
2.2 - Operational Waste - Convenience of Recycling	100%

Urban Ecology Overall contribution 5.5%



1.1 Communal Spaces	100%
2.1 Vegetation	100%
2.2 Green Roofs	100%
2.3 Green Walls and Facades	0%
2.4 Private Open Space - Balcony / Courtyard Ecology	0%
3.1 Food Production - Residential	0%

Innovation Overall contribution 9.0%



1.1 Innovation	0%

Credit breakdown

Management Overall contribution 2%

1.1 Pre-Application Meeting		0%
Score Contribution	This credit contributes 37.5% towards the category score.	
Criteria	Has an ESD professional been engaged to provide sustainability advice from schematic design to construction? AND Has the ESD professional been involved in a pre-application meeting with Council?	
Question	Criteria Achieved ?	
Project	No	
2.2 Thermal Performance Modelling - Multi-Dwelling Residential		100%
Score Contribution	This credit contributes 25.0% towards the category score.	
Criteria	Have preliminary NatHERS ratings been undertaken for all thermally unique dwellings?	
Question	Criteria Achieved ?	
Apartment	Yes	
3.1 Metering		100%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Have utility meters been provided for all individual dwellings?	
Question	Criteria Achieved ?	
Apartment	Yes	
3.3 Metering		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Have all major common area services been separately submetered?	
Question	Criteria Achieved ?	
Apartment	No	
4.1 Building Users Guide		100%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Will a building users guide be produced and issued to occupants?	
Question	Criteria Achieved ?	
Project	Yes	

Water

Overall contribution 5% Minimum required 50%

Section Notes: Fire system testing water will be storage in rain water tanks

Water Approach	
What approach do you want to use for Water?:	Use the built in calculation tools
Project Water Profile Question	
Do you have a reticulated third pipe or an on-site water recycling system?:	No
Are you installing a swimming pool?:	No
Are you installing a rainwater tank?:	Yes
Water fixtures, fittings and connections	
Building: All	Building 1
Showerhead: All	4 Star WELS (>= 6.0 but <= 7.5)
Bath: All	Scope out
Kitchen Taps: All	>= 5 Star WELS rating
Bathroom Taps: All	>= 5 Star WELS rating
Dishwashers: All	Default or unrated
WC: All	>= 4 Star WELS rating
Urinals: All	Scope out
Washing Machine Water Efficiency: All	Occupant to Install
Which non-potable water source is the dwelling/space connected to?:	
1 2 3 4	Tank 2
5 6 7 8 9 10 11 12 13	Tank 1
Non-potable water source connected to Toilets: All	Yes
Non-potable water source connected to Laundry (washing machine): All	No
Non-potable water source connected to Hot Water System: All	No
Rainwater Tanks	
What is the total roof area connected to the rainwater tank?:	
Tank 1	613 m²
Tank 2	415 m²

Tank Size:	
Tank 1	8,000 Litres
Tank 2	8,000 Litres
Irrigation area connected to tank:	
Tank 1	467 m^2
Tank 2	467 m^2
Is connected irrigation area a water efficient garden?:	
Tank 1	Yes
Tank 2	Yes
Other external water demand connected to tank?:	
Tank 1	-
Tank 2	-

1.1 Potable water use reduction		40%
Score Contribution	This credit contributes 71.4% towards the category score.	
Criteria	What is the reduction in total potable water use due to efficient fixtures, appliances, rainwater use and recycled water use? To achieve points in this credit there must be >25% potable water reduction.	
Output	Reference	
Project	8271 kL	
Output	Proposed (excluding rainwater and recycled water use)	
Project	6817 kL	
Output	Proposed (including rainwater and recycled water use)	
Project	6079 kL	
Output	% Reduction in Potable Water Consumption	
Project	26 %	
Output	% of connected demand met by rainwater	
Project	61 %	
Output	How often does the tank overflow?	
Project	Very Often	
Output	Opportunity for additional rainwater connection	
Project	2981 kL	

3.1 Water Efficient Landscaping		100%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	Will water efficient landscaping be installed?	
Question	Criteria Achieved ?	
Project	Yes	

4.1 Building Systems Water Use Reduction	100%
Score Contribution	This credit contributes 14.3% towards the category score.
Criteria	Where applicable, have measures been taken to reduce potable water consumption by >80% in the buildings air-conditioning chillers and when testing fire safety systems?
Annotation	Rainwater tanks
Question	Criteria Achieved ?
Project	Yes

Energy Overall contribution 15% Minimum required 50%

Dwellings Energy Approach	
What approach do you want to use for Energy?:	Use the built in calculation tools
Project Energy Profile Question	
Are you installing any solar photovoltaic (PV) system(s)?:	Yes
Are you installing any other renewable energy system(s)?:	No
Gas supplied into building:	Natural Gas
Dwelling Energy Profiles	
Building: All	Building 1
Below the floor is:	
1 2 3 4 5 6 7	Ground or Carpark
8 9 10 11 12 13	Another Occupancy
Above the ceiling is:	
1 2 3 4 5 6 7 8 9 10	Another Occupancy
11 12 13	Outside
Exposed sides: All	2

NatHERS Annual Energy Loads - Heat:	
1	91.9 MJ/sqm
2	88.2 MJ/sqm
3	109 MJ/sqm
4	106 MJ/sqm
5 6	108 MJ/sqm
7	86.4 MJ/sqm
8	99.1 MJ/sqm
9	43.8 MJ/sqm
10	54.0 MJ/sqm
11	77.4 MJ/sqm
12	88.1 MJ/sqm
13	68.3 MJ/sqm
NatHERS Annual Energy Loads - Cool:	
1	7.5 MJ/sqm
2 5	8.0 MJ/sqm
3	9.8 MJ/sqm
4	21.0 MJ/sqm
6	12.2 MJ/sqm
7	12.5 MJ/sqm
8	11.2 MJ/sqm
9	12.3 MJ/sqm
10	12.1 MJ/sqm
11	21.5 MJ/sqm
12	14.1 MJ/sqm
13	20.0 MJ/sqm
NatHERS star rating:	
1 2 7 11	6.8
3	6.2
4	5.9
5	6.3
6	6.1
8	6.4
9	8.1
10	7.8
12	6.7
13	7.1
Type of Heating System: All	E Reverse cycle ducted
Heating System Efficiency: All	std/MEPS

Type of Cooling System: All	Refrigerative space
Cooling System Efficiency: All	Current Default / MEPS
Type of Hot Water System: All	B Electric Instantaneous
Is the hot water system shared by multiple dwellings?: All	No
% Contribution from solar hot water system: All	-
Clothes Line:	
1 4 5 6 7 8 9 10 11 12 13	A No drying facilities
2 3	D Private outdoor clothesline
Clothes Dryer: All	Occupant to Install

Solar Photovoltaic systems

System Size (lesser of inverter and panel capacity):	
PV 1	5.0 kW peak
PV 2	5.0 kW peak
Orientation (which way is the system facing)?:	
PV 1	East
PV 2	West
Inclination (angle from horizontal):	
PV 1	2.0 Angle (degrees)
PV 2	2.0 Angle (degrees)

1.2 Thermal Performance Rating - Residential 16%

Score Contribution	This credit contributes 31.6% towards the category score.
Criteria	What is the average NatHERS rating?
Output	Average NATHERS Rating (Weighted)
Apartment	6.6 Stars

2.1 Greenhouse Gas Emissions 100%

Score Contribution	This credit contributes 10.5% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?
Output	Reference Building with Reference Services (BCA only)
Apartment	446,580 kg CO2
Output	Proposed Building with Proposed Services (Actual Building)
Apartment	222,244 kg CO2
Output	% Reduction in GHG Emissions
Apartment	50 %

2.2 Peak Demand		0%
Score Contribution	This credit contributes 5.3% towards the category score.	
Criteria	What is the % reduction in instantaneous (peak-hour) demand against the benchmark?	
Output	Peak Thermal Cooling Load - Baseline	
Apartment	717 kW	
Output	Peak Thermal Cooling Load - Proposed	
Apartment	699 kW	
Output	Peak Thermal Cooling Load - % Reduction	
Apartment	2 %	

2.3 Electricity Consumption		100%
Score Contribution	This credit contributes 10.5% towards the category score.	
Criteria	What is the % reduction in annual electricity consumption against the benchmark?	
Output	Reference	
Apartment	437,824 kWh	
Output	Proposed	
Apartment	217,886 kWh	
Output	Improvement	
Apartment	50 %	

2.4 Gas Consumption		N/A ◈ Scoped Out
This credit was scoped out	Gas is provided only for cooking.	

3.1 Carpark Ventilation		0%
Score Contribution	This credit contributes 10.5% towards the category score.	
Criteria	If you have an enclosed carpark, is it: (a) fully naturally ventilated (no mechanical ventilation system) or (b) 40 car spaces or less with Carbon Monoxide monitoring to control the operation and speed of the ventilation fans?	
Question	Criteria Achieved ?	
Project	No	

3.2 Hot Water		100%
Score Contribution	This credit contributes 5.3% towards the category score.	
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?	
Output	Reference	
Apartment	181,959 kWh	
Output	Proposed	
Apartment	97,403 kWh	
Output	Improvement	
Apartment	46 %	

3.4 Clothes Drying		100%	
Score Contribution	This credit contributes 5.3% towards the category score.		
Criteria	What is the % reduction in annual energy consumption (gas and electricity) from a combination of clothes lines and efficient driers against the benchmark?		
Output	Reference		
Apartment	31,376 kWh		
Output	Proposed		
Apartment	24,775 kWh		
Output	Improvement		
Apartment	21 %		

3.6 Internal Lighting - Residential Multiple Dwellings		100%	
Score Contribution	This credit contributes 10.5% towards the category score.		
Criteria	Is the maximum illumination power density (W/m2) in at least 90% of the relevant building class at least 20% lower than required by Table J6.2a of the NCC 2019 Vol 1 (Class 2-9) and Clause 3.12.5.5 NCC 2019 Vol 2 (Class 1 & 10)?		
Question	Criteria Achieved ?		
Apartment	Yes		

4.2 Renewable Energy Systems - Solar		100%	
Score Contribution	This credit contributes 5.3% towards the category score.		
Criteria	What % of the estimated energy consumption of the building class it supplies does the solar power system provide?		
Output	Solar Power - Energy Generation per year		
Apartment	11,206 kWh		
Output	% of Building's Energy		
Apartment	5 %		

4.4 Renewable Energy Systems - Other		N/A	⊘ Disabled
This credit is disabled	No other (non-solar PV) renewable energy is in use.		

Stormwater

Overall contribution 14% Minimum required 100%

Which stormwater modelling are you using?:	Melbourne Water STORM tool	
1.1 Stormwater Treatment	100%	
Score Contribution	This credit contributes 100.0% towards the category score.	
Criteria	Has best practice stormwater management been demonstrated?	
Question	STORM score achieved	
Project	106	
Output	Min STORM Score	
Project	100	

IEQ Overall contribution 9% Minimum required 50%

IEQ DTS	
Use the BESS Deemed to Satisfy (DtS) method for IEQ?:	No
Dwellings IEQ Approach	
What approach do you want to use for dwellings?:	Use the built in calculation tools
Dwelling Daylight Room Profile Questions	
Room Designation:	
Bedroom DTS Pass G.06 Bedroom 2	Bedroom
Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	Living
Quantity:	
Bedroom DTS Pass	150
Living Dual Aspect Pass	64
Living DTS Pass (Not Dual Aspect)	5
G.06 Bedroom 2	1
Auto-Pass:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	Yes
G.06 Bedroom 2	No
Room Floor Area:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	-
G.06 Bedroom 2	10.4 m^2
Vertical Angle:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	-
G.06 Bedroom 2	11.8 Angle (degrees)
Horizontal Angle:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	-
G.06 Bedroom 2	20.5 Angle (degrees)
Window Area:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	-
G.06 Bedroom 2	3.8 m^2

Window Orientation:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	-
G.06 Bedroom 2	South
Glass Type:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	-
G.06 Bedroom 2	Clear Double (VLT 0.71)
Daylight Criteria Achieved?:	
Bedroom DTS Pass Living Dual Aspect Pass Living DTS Pass (Not Dual Aspect)	Yes
G.06 Bedroom 2	No

1.1 Daylight Access - Living Areas	100%
Score Contribution	This credit contributes 27.3% towards the category score.
Criteria	What % of living areas achieve a daylight factor greater than 1%
Output	Calculated percentage
Apartment	100 %

1.2 Daylight Access - Bedrooms	66%
Score Contribution	This credit contributes 27.3% towards the category score.
Criteria	What % of bedrooms achieve a daylight factor greater than 0.5%
Output	Calculated percentage
Apartment	99 %

1.3 Winter Sunlight	0%
Score Contribution	This credit contributes 9.1% towards the category score.
Criteria	Do 70% of dwellings receive at least 3 hours of direct sunlight in all Living areas between 9am and 3pm in mid-winter?
Question	Criteria Achieved ?
Apartment	No

1.5 Daylight Access - Minimal Internal Bedrooms	100%
Score Contribution	This credit contributes 9.1% towards the category score.
Criteria	Do at least 90% of dwellings have an external window in all bedrooms?
Question	Criteria Achieved ?
Apartment	Yes

2.1 Effective Natural Ventilation	0%
Score Contribution	This credit contributes 27.3% towards the category score.
Criteria	What % of dwellings are effectively naturally ventilated?
Question	Percentage Achieved?
Apartment	33 %

Transport Overall contribution 4%

1.1 Bicycle Parking - Residential		0%
Score Contribution	This credit contributes 22.2% towards the category score.	
Criteria	How many secure and undercover bicycle spaces are there per dwelling for residents?	
Question	Bicycle Spaces Provided ?	
Apartment	10	
Output	Min Bicycle Spaces Required	
Apartment	69	

1.2 Bicycle Parking - Residential Visitor		100%
Score Contribution	This credit contributes 22.2% towards the category score.	
Criteria	How many secure bicycle spaces are there per 5 dwellings for visitors?	
Question	Visitor Bicycle Spaces Provided ?	
Apartment	16	
Output	Min Visitor Bicycle Spaces Required	
Apartment	14	

1.3 Bicycle Parking - Convenience Residential		N/A	⊘ Disabled
This credit is disabled	Credit 1.1 must be achieved first.		

2.1 Electric Vehicle Infrastructure		100%
Score Contribution	This credit contributes 22.2% towards the category score.	
Criteria	Are facilities provided for the charging of electric vehicles?	
Question	Criteria Achieved ?	
Project	Yes	

2.2 Car Share Scheme		0%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	Has a formal car sharing scheme been integrated into the development?	
Question	Criteria Achieved ?	
Project	No	

2.3 Motorbikes / Mopeds		0%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	Are a minimum of 5% of vehicle parking spaces designed and labelled for motorbikes (must be at least 5 motorbike spaces)?	
Question	Criteria Achieved ?	
Project	No	

Waste Overall contribution 2%

1.1 - Construction Waste - Building Re-Use	0%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used?
Question	Criteria Achieved ?
Project	No

2.1 - Operational Waste - Food & Garden Waste	0%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are facilities provided for on-site management of food and garden waste?
Question	Criteria Achieved ?
Project	No

2.2 - Operational Waste - Convenience of Recycling	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are the recycling facilities at least as convenient for occupants as facilities for general waste?
Question	Criteria Achieved ?
Project	Yes

Urban Ecology Overall contribution 4%

1.1 Communal Spaces		100%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	Is there at least the following amount of common space measured in square meters : * 1m² for each of the first 50 occupants * Additional 0.5m² for each occupant between 51 and 250 * Additional 0.25m² for each occupant above 251?	
Question	Common space provided	
Apartment	189 m²	
Output	Minimum Common Space Required	
Apartment	90 m²	
2.1 Vegetation		100%
Score Contribution	This credit contributes 44.4% towards the category score.	
Criteria	How much of the site is covered with vegetation, expressed as a percentage of the total site area?	
Question	Percentage Achieved ?	
Project	34 %	
2.2 Green Roofs		100%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	Does the development incorporate a green roof?	
Question	Criteria Achieved ?	
Project	Yes	
2.3 Green Walls and Facades		0%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	Does the development incorporate a green wall or green façade?	
Question	Criteria Achieved ?	
Project	No	
2.4 Private Open Space - Balcony / Courtyard Ecology		0%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	Is there a tap and floor waste on every balcony / in every courtyard?	
Question	Criteria Achieved ?	
Apartment	No	
3.1 Food Production - Residential		0%
Score Contribution	This credit contributes 11.1% towards the category score.	
Criteria	What area of space per resident is dedicated to food production?	
Question	Food Production Area	
Apartment	-	
Output	Min Food Production Area	
Apartment	33 m²	

Innovation Overall contribution 0%

1.1 Innovation		0%
Score Contribution	This credit contributes 100.0% towards the category score.	
Criteria	What percentage of the Innovation points have been claimed (10 points maximum)?	

Disclaimer

The Built Environment Sustainability Scorecard (BESS) has been provided for the purpose of information and communication. While we make every effort to ensure that material is accurate and up to date (except where denoted as 'archival'), this material does in no way constitute the provision of professional or specific advice. You should seek appropriate, independent, professional advice before acting on any of the areas covered by BESS.

The Municipal Association of Victoria (MAV) and CASBE (Council Alliance for a Sustainable Built Environment) member councils do not guarantee, and accept no legal liability whatsoever arising from or connected to, the accuracy, reliability, currency or completeness of BESS, any material contained on this website or any linked sites

Appendix 2 - Preliminary Energy Ratings

The FirstRate5 preview energy ratings incorporate the full list of assumptions as listed below. Note, additional glazing or shading specifications can be incorporated to improve these ratings.

Thermal Group	Apartment Modelled	No. of similar/better performing apartments	Similar or better performing apartments	Cooling Load (MJ/m^2)	Star Rating
1	G.01	10	G.06, 1.01, 1.06, 2.01, 2.06, 3.01, 3.04, 4.01, 4.02	7.5	6.8
2	G.02	14	G.03, G.04, G.05, 1.02, 1.03, 1.04, 1.05, 2.02, 2.03, 2.04, 2.05, 3.02, 3.03	8.0	6.8
3	G.10	4	G.15, 1.10, 1.15	9.5	6.3
4	G.11	4	G.14, 1.11, 1.14	21.0	5.9
5	G.12	8	G.13, 1.12, 1.13, 2.10, 2.11, 3.08, 3.09	8.0	6.3
6	G.16	6	G.09, 1.16, 1.09, 2.08, 3.06	12.2	6.1
7	G.17	12	G.07, G.08, G.18, 1.07, 1.08, 1.17, 1.18, 2.15, 2.07, 3.05, 3.12	12.5	6.8
8	2.12	4	2.09, 3.10, 3.07	11.2	6.4
9	2.13	1		12.3	8.1
10	2.14	1		12.1	7.8
11	3.11	1		20.7	6.7
12	4.05	2	4.04	14.1	6.7
13	4.06	2	4.03	20.0	7.1
				Average star rating	6.6

Full list of assumptions:

- Offset from north point: -7.6 degrees
- Heating and cooling choices when optional - All rooms except as indicated.
- Floor type - suspended slab to all floors
- Floor Covering
    - Tiles Bathrooms
    - Living Areas
        - North facing: Exposed concrete slab.
        - South facing: Carpet
        - Timber for all the rest
    - Carpet on Bedrooms
- Ceiling insulation – R4.0 + 1 reflective foil insulation where there is a balcony above an apartment, or a roof above an apartment

- Roof colour – medium light grey / dull zincalume.
- Balcony tile colour - light
- Wall colour – medium
- Wall height to ceiling – all floors 2.7m
- Exterior Walls –
    - 150mm precast concrete R2.0 internal insulation and 10mm plasterboard over. No external cladding on precast concrete.
- Interior walls – R1.0 insulation between condition and unconditioned spaces
- Windows
    - All windows/sliding doors to balconies 2.4m height
    - All windows from bedrooms not shown – assume same head height (2.4m).
    - Other window heights as shown in full on elevations
    - Window widths all as per plans
    - Glazing type:
        1. Try first: Aluminium frame, double glazed air filled gap, clear (U-value = 4.8, SHGC = 0.59)
        2. If this fails try this in required apartments: Aluminium frame, double glazed argon filled gap, low E film (U-value = 4.1, SHGC=0.52)
        3. Next try: Aluminium thermally broken frame, double glazed air filled gap, low E film (U-value = 3.1, SHGC=0.49)
        4. Finally try: Aluminium thermally broken frame, double glazed argon filled gap, low E film (U-value = 2.9, SHGC=0.51)
    - All windows and doors weather stripped
- Exhaust fans, all sealed –
    - All bathrooms and ensuites: 300mm
    - Kitchen: 180mm
- Ceiling fans – none
- Eaves – included where appropriate
- Wing walls – included where appropriate
- Fences – included where appropriate
- Lights – no unsealed downlights. Max 4W/m2 density. If downlights are installed they will be IC rated downlights with insulation installed over downlight as per manufacturer's recommendations.

Appendix 3 - Daylight Assessment

The following details the BESSS daylight deemed to satisfy compliance outcomes for the development (Per BESS tool notes IEQ 1.1-1.5)

Level	Apartment	Zone	Dual Aspect	Room compliance achieved	Compliance achieved
G	1	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	2	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	3	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	4	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	5	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	6	Living	Yes	Yes	No
		Bed 1	No	Yes	
		Bed 2	No	No	
	7	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	8	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	9	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	10	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	11	Living	Yes	Yes	Yes

		Bed 1	No	Yes	
	12	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	13	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	14	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
	15	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	16	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	17	Living	No	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	18	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
1	1	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	2	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	3	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	4	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	5	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	6	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	7	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	

	8	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	9	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	10	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	11	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
	12	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	13	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	14	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
	15	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	16	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	17	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	18	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
2	1	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	2	Living	No	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	3	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	4	Living	Yes	Yes	Yes
		Bed 1	No	Yes	

		Bed 2	No	Yes	
	5	Living	No	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	6	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	7	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	8	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	9	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	10	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	11	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	12	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	13	Living	No	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	14	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	15	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
3	1	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
		Bed 4	No	Yes	
	2	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	

	3	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	4	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	5	Living	No	Yes	Yes
		Bed 1	No	Yes	
	6	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	7	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	8	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	9	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	10	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	11	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
		Bed 4	No	Yes	
	12	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
4	1	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	2	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	
	3	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	

		Bed 3	No	Yes	
	4	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	5	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
	6	Living	Yes	Yes	Yes
		Bed 1	No	Yes	
		Bed 2	No	Yes	
		Bed 3	No	Yes	

No. dual aspect rooms	Number of compliant dwellings	Percentage dwelling compliance
64	**68**	**99%**

Note where residential living areas and/or bedrooms were not compliant with DTS rules, these rooms were input into the BESS Built-in Calculator tool and assessed accordingly.

Appendix 4 - Natural Ventilation Assessment

Apt.	Compliance
G.01	No
G.02	No
G.03	No
G.04	No
G.05	No
G.06	Yes
G.07	Yes
G.08	No
G.09	No
G.10	Yes
G.11	No
G.12	No
G.13	No
G.14	No
G.15	No
G.16	No
G.17	No
G.18	Yes
1.01	No
1.02	No
1.03	No
1.04	No
1.05	No
1.06	No
1.07	Yes
1.08	No
1.09	No
1.10	Yes
1.11	No
1.12	No
1.13	No
1.14	No
1.15	Yes
1.16	No
1.17	No
1.18	Yes
2.01	Yes
2.02	No
2.03	Yes
2.04	Yes
2.05	No
2.06	Yes
2.07	No
2.08	Yes
2.09	Yes
2.10	No
2.11	No
2.12	No
2.13	No
2.14	No
2.15	No
3.01	Yes
3.02	Yes
3.03	Yes
3.04	Yes
3.05	No
3.06	Yes
3.07	Yes
3.08	Yes
3.09	Yes
3.10	No
3.11	No
3.12	Yes
4.01	No
4.02	No
4.03	No
4.04	No
4.05	No
4.06	No
Compliance	**33%**

Appendix 5 - STORM Report

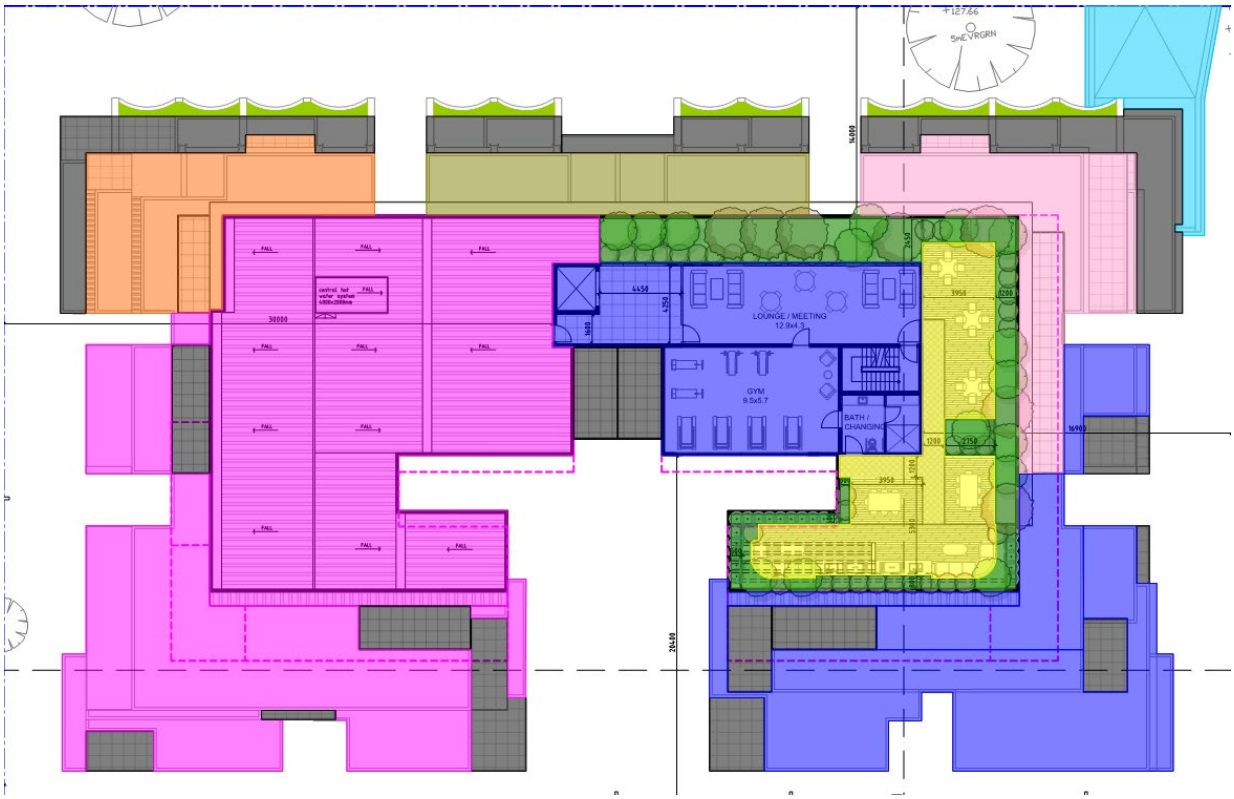
STORM Rating Report

TransactionID:	1297913
Municipality:	MONASH
Rainfall Station:	MONASH
Address:	718-724 High Street Road
	Glen Waverley
	VIC 3150
Assessor:	LID Consulting
Development Type:	Residential - Multiunit
Allotment Site (m2):	3,011.00
STORM Rating %:	106

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
NW Roofs and Balconies	97.00	Raingarden 100mm	6.00	0	133.90	0.00
N Roofs	71.00	Raingarden 100mm	6.00	0	133.60	0.00
NE Roofs and Balconies	110.00	Raingarden 100mm	6.00	0	133.20	0.00
West Roofs	613.00	Rainwater Tank	8,000.00	80	119.00	62.00
East Roofs	415.00	Rainwater Tank	8,000.00	80	134.00	72.00
Driveway	46.00	None	0.00	0	0.00	0.00
Roof Top and Green Roofs	199.00	Raingarden 100mm	91.00	0	134.00	0.00
Untreated Roofs and Balconies	262.00	None	0.00	0	0.00	0.00

Date Generated: 22-Dec-2021 Program Version: 1.0.0

Appendix 6 - STORM Area Proof



Driveway	46	sq m
East Roofs	415	sq m
Green Roof	91	sq m
North East Roofs and Balconies	110	sq m
North Roofs	71	sq m
North West Roofs and Balconies	97	sq m
Roof Top	108	sq m
Small Green Roofs	18	sq m
Untreated Roofs and Balconies	262	sq m
West Roofs	613	sq m

Appendix 7 - Public Transport Local Area Map