



2 – 6 LAMPARD ROAD, DROUIN

SUSTAINABLE DESIGN ASSESSMENT

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CONTENTS

1	INTRODUCTION.....	4
1.1	DEVELOPMENT DESCRIPTION	4
2	PLANNING REQUIREMENTS.....	5
2.1	REFERENCE DOCUMENTATION.....	5
2.2	CLAUSE 55 ASSESSMENT.....	5
3	ESD INITIATIVES	11
3.1	INDOOR ENVIRONMENTAL QUALITY (IEQ)	11
3.2	ENERGY EFFICIENCY	11
3.3	WATER EFFICIENCY	12
3.4	STORMWATER.....	12
3.5	BUILDING MATERIALS & CONSTRUCTION WASTE.....	12
3.6	WASTE AND RECYCLING OBJECTIVES.....	13
3.7	URBAN ECOLOGY	13
4	PRELIMINARY NATHERS ASSESSMENT	15
4.1	CLASS 2 NATHERS.....	15
4.1.1	THERMAL ENVELOPE.....	15
4.1.2	NATHERS ASSESSMENT & RESULTS.....	15
4.1.3	WHOLE OF HOME.....	17
4.2	CLASS 1A NATHERS	18
4.2.1	THERMAL ENVELOPE	18
4.2.2	NATHERS ASSESSMENT & RESULTS.....	18
4.2.3	WHOLE OF HOME.....	19
	APPENDIX – A VOC LIMITS	21
	VOC LIMITS – PAINTS, ADHESIVES & SEALANTS	21
	VOC LIMITS – CARPETS	21
	FORMALDEHYDE LIMITS	22
	APPENDIX B – BREEZE PATH DIAGRAM	23

1 INTRODUCTION

This report outlines the Environmentally Sustainable Design (ESD) initiatives for the proposed social housing development at 2-6 Lampard Road, Drouin.

The purpose of the Sustainable Design Assessment (SDA) is to identify key strategies to reduce the environmental impact of the development covering energy and water efficiency, waste management, indoor environment quality and materials selection. It also outlines performance targets to ensure that sustainability outcomes are quantifiable and monitored through the project's lifecycle.

Prepared in support of the proposed development within the Baw Baw Shire Council area, this assessment addresses the relevant sustainability requirements outlined in Clause 55.05 of the Baw Baw Planning Scheme. **This report also identifies additional sustainability measures which is beyond planning requirements in Section-03** of this report. In summary, the project aims to deliver inclusive, affordable housing while demonstrating a strong commitment to environmental performance.

1.1 DEVELOPMENT DESCRIPTION

The subject site is in Drouin, part of West Gippsland, about 90km east of Melbourne. The development site is approximately 3,693m². The site is bordered by neighbouring housing on the south and west, and Lampard Road and Main South Road on the north and east respectively. The proposed development has a total of 45 dwellings, including 5 townhouses and 40 apartments.

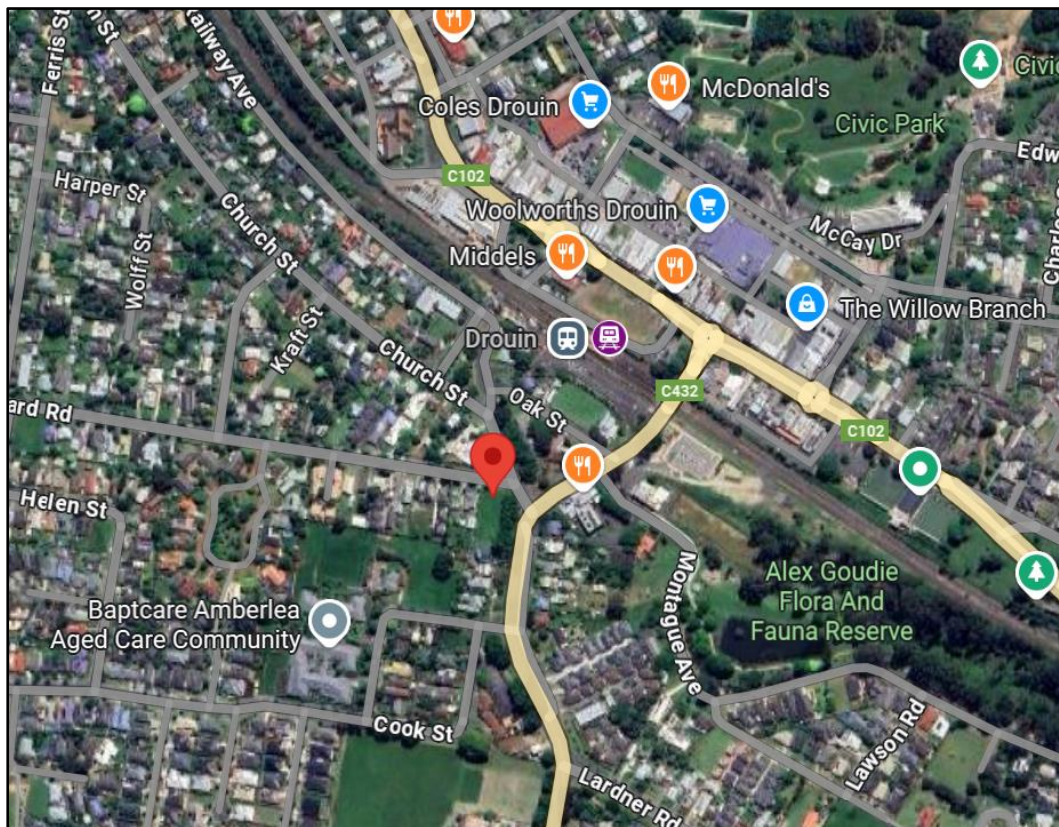


Figure 1 Aerial view of the project site

2 PLANNING REQUIREMENTS

This development proposal is subject to planning requirements of the Baw Baw Planning Scheme. Under the provisions of the General Residential Zone, a development for multiple dwellings must meet the requirements of Clause 55, which implements a series of 'deemed to comply' standards relating to neighbourhood character, liveability, external amenity, and sustainability.

The standards of Clause 55 outline the key sustainability requirements which apply to this development. An assessment against these planning requirements are set out below in Section 2.3.

Beyond planning requirements, this SDA also incorporates ESD initiatives which ensure the design meets current best practice sustainability targets in the areas of energy reduction, water sensitive urban design and waste management. While not a requirement of Clause 55, these initiatives align with current authority and industry expectations around sustainable development outcomes. A full list of ESD initiatives is outlined in Section 3.

2.1 REFERENCE DOCUMENTATION

This SDA should be read in conjunction with the other relevant documentation included within the development's town planning submission to council. These documents may include the following:

- Architectural documentation.
- Landscape plans.
- Waste Management Plan.
- STORM Report and associated plan details.

2.2 CLAUSE 55 ASSESSMENT

Table 1 Summary of the Clause 55 assessment

CLAUSE 55.05 - REQUIREMENT	ESD RESPONSE
Clause 55 Standard B2-7 Tree Canopy Objectives: To provide tree canopy that responds to the neighbourhood character of the area and reduces the visual impact of buildings on the streetscape. To preserve existing canopy cover and support the provision of new canopy cover. To ensure new canopy trees are climate responsive, support biodiversity, wellbeing and amenity, and help reduce urban heat. A minimum canopy cover should be least 20% of the total site area for this development. Existing trees to be retained meet all the following: • Has a height of at least 5 metres,	Refer landscape documentation.

• Has a trunk circumference of 0.5 metres or greater at 1.4 metres above ground level, • Has a trunk that is located at least 4 metres from proposed buildings. The minimum canopy cover is met using any combination of trees specified in Table B2-7.2. Existing trees that are retained can be used in calculating canopy cover. To provide at least one new or retained tree in the front setback and the rear setback. Trees are located in either: • An area of deep soil as specified in Table B2-7.2; or • A planter as specified in Table B2-7.2. Any tree required to be planted under this standard must be of species to the satisfaction of the responsible authority, having regard to the location and relevant geographic factors.	
Clause 55 Standard B3-10 Natural Ventilation Objectives: To encourage natural ventilation of dwellings. To allow occupants to effectively manage natural ventilation of dwellings. At least 40 per cent of dwellings have openable windows, doors or other ventilation devices in external walls of the building that provide: • A maximum breeze path through the dwelling of 18 metres. • A minimum breeze path through the dwelling of 5 metres. • Ventilation openings with approximately the same size. The breeze path is measured between the ventilation openings on different orientations of the dwelling.	In reference to the Architectural floor plans and elevations, each individual unit of the apartments are naturally ventilated with large windows for bedrooms, living rooms in addition to the common corridors. Breeze path has been assessed in accordance with the objectives of the Standard B3-10. Refer Appendix B. The requirements of the Standard B3-10 are met.

Clause 55 Standard B5-1 Permeability and stormwater management objective: To reduce impact of increased stormwater run-off on the drainage system and downstream waterways. To facilitate on-site stormwater infiltration. To encourage stormwater management that maximises the retention and reuse of stormwater. To contribute to urban cooling. The site area covered by the pervious surface is at least 20% of the site. The development includes a stormwater management system which is designed to: • Meet best practise quantitative performance objectives for stormwater quality specified in the Urban stormwater management guidance (EPA Publication 1739.1,2021) of: - suspended solids reduction in mean annual load - total phosphorous and total nitrogen 45% reduction in mean annual load - litter 70% reduction of mean annual load Direct flows of stormwater into treatment areas, garden areas, tree pits and permeable surfaces, with drainage of residual flows to the legal point of discharge.	31% of the site area is covered by pervious area – Refer to <i>Figure 3</i>. The development will include a stormwater management system to meet the best practice quantitative performance objectives for stormwater quality specified in the Urban stormwater management guidance (EPA Publication 1739.1, 2021) – Refer civil report. The objectives of Standard B5-1 have been met.
Clause 55 Standard B5-2 Overshadowing domestic solar energy systems objective: To ensure that the height and setback of a building from a boundary allows reasonable solar access to existing domestic solar energy systems on the roofs of buildings. Any part of a new building that will reduce the sunlight at any time between 9am and 4 pm on 22nd September to an existing domestic solar energy system on the roof of a building on an adjoining lot be set back from the boundary to that lot by at least 1 metre at 3.6 metres above ground level, plus 0.3 metres for every metre of building height over 3.6 metres up to 6.9	Refer to Architect's shadow studies/analysis which demonstrates that neighbouring buildings are not overshadowed by the proposed development. Hence the requirements of the Standard B5-2 are met.

metres, plus 1 metre for every metre of height over 6.9 metres. In Clause 55. Standard 05-2 domestic solar energy system means a domestic solar energy system that existed at the date the application was lodged.	
Clause 55 Standard B5-3 Rooftop solar energy generation area objective: To support the future installation of appropriately sited rooftop solar energy systems for a dwelling. Clause 55.05-3 defines rooftop solar energy area as the area provided on the roof of a dwelling to enable the future installation of a solar energy system. An area on the roof is capable of siting a rooftop solar energy area for each dwelling which: • Has a minimum depth of 1.0m • Has a minimum area in accordance with Table B5-3 of standard B5-3 in Clause 55.05-3. • Is oriented to the north, west or east. • Is positioned on the top two thirds of a pitched roof. • Can be a contiguous area or multiple smaller areas. • Is free of obstructions on the roof of the dwelling within twice the height of each obstruction (H), measured horizontally (D) from the centre point of the base of the obstruction to the nearest point of the rooftop solar energy area – in reference to diagram B5-3 allowable distance between obstructions and the rooftop solar energy area.	As per Standard B5-3 Rooftop solar energy generation area objective isn't applicable to apartments. Townhouses will comply with the requirements as proposed in Architectural drawings, refer roof plan. Hence the requirements of the Standard B5-3 are met.
Clause 55 Standard B5-4 Solar protection to new north-facing windows objectives:	North facing windows have appropriate shading 0.25 times the window height in accordance standard B5-4 in Clause 55. Refer to architectural drawings.

To encourage external shading of north facing windows to minimise summer heat gain. Standard B5-4 in Clause 55.05-4: North facing windows are shaded by eaves, fixed horizontal shading devices or fixed awnings with a minimum horizontal depth of 0.25 times the window height.	Hence the requirements of the Standard B5-4 are met.
Clause 55 Standard B5-5 Waste and recycling objectives: To ensure dwellings are designed to facilitate waste recycling. To ensure that waste and recycling facilities are accessible and are of sufficient size to manage organic and general waste, and mixed and glass recycling. The development includes a shared bin storage area for use by each dwelling of at least the applicable area, depth and height specified in Table B5-5.2 of Clause 55.05-5. Apartment bin storage. – 0.5m² per dwelling plus 5m² in a shared waste storage area. The apartment bin storage has a minimum depth of 1.0m and a minimum height of 2.7m. Enclosed bin storage areas are ventilated by natural ventilation openings to the external air with an area of at least 5% of the area for bin storage area or a mechanical exhaust ventilation system. A tap and drain are provided to wash bins. A continuous path of travel is provided from each dwelling to bin storage areas. Each dwelling includes an internal waste and recycling storage space of at least 0.07 cubic metres with a minimum depth of 250mm.	The development bin storage area will allow for assorted disposal of general waste, recycling, Food and Garden waste (FOGO) and mixed and glass recycling in-line with Clause 55 Standard B5-5 requirements. The development will include a shared bin storage with area 29 m² complying Table B5-5.2 of Clause 55 Standard B5-5 (based on 45 apartment dwellings). This space is mechanically ventilated. Refer to Waste Management Plan provided by the Waste Consultant. Hence the requirements of the Standard B5-5 are met.

Clause 55 Standard B5-6 Noise impact's objective: To minimise the impact of mechanical plant noise located in the development. Mechanical plant, including mechanical car storage and lift facilities are not located immediately adjacent to bedrooms of new or existing dwellings or small second dwellings, unless a solid barrier is in place to provide a line-of-sight barrier to transmission of noise and the location of all relevant bedrooms.	A solid barrier is in place between all bedrooms that are located immediately adjacent to the apartment building elevators. Refer to Architect's report. Hence the requirements of the Standard B5-6 are met.
Clause 55 Standard B5-7 Energy efficiency for apartment developments objectives: To achieve energy efficient dwellings and buildings. To ensure dwellings achieve adequate thermal efficiency. Dwellings in or forming part of an apartment development located in a climate zone identified in Table B5-7 of Clause 55.05-7 does not exceed the maximum NatHERS annual cooling load.	Each dwelling will achieve a NatHERS rating $\geq$ 7-stars. All dwellings will have a cooling load $\leq 21\text{MJ}/^2$ as per NatHERS Heating and Cooling Loads Limit 2022: Table 7 – Class 2 SOUs and Class 4 part of buildings – Heating and cooling load limits applying to NatHERS 7-stars, complying with Clause 55.05-7 Energy Efficiency for apartment developments objects. Refer to Section 4. Hence the requirements of the Standard B5-7 are met.

3 ESD INITIATIVES

This section outlines the various ESD initiatives targeted for the project which meets and/or exceeds the planning requirements of Clause 55.05.

As detailed below, the project addresses sustainability categories – including Indoor Environment Quality (IEQ), Energy Efficiency, Water Efficiency, Stormwater Management, Sustainable Building Materials, Construction Waste Management and Urban Ecology.

3.1 INDOOR ENVIRONMENTAL QUALITY (IEQ)

Improving the IEQ allows building occupants to enjoy a more comfortable space with healthier and more cohesive indoor environment. We spend a large amount of our time indoors; therefore, the quality of the indoor environment is vital to our health and wellbeing.

IEQ strategies implemented are shown below.

- Operable windows will be provided to allow occupants control of their environment.
- Insulated walls and roofs help reduce heat transfer and improve thermal comfort.
- Paints, adhesives and sealants used will comply with the Low-Volatile Organic Compound (VOC) paints, adhesives and sealants as shown in APPENDIX – A VOC LIMITS.
- Engineered wood used will comply with the low formaldehyde emission limits for engineered wood as shown in APPENDIX – A VOC LIMITS.

3.2 ENERGY EFFICIENCY

Adopting energy efficiency practices will reduce the greenhouse gas emissions for the development, helping to reduce the buildings environmental impact by reducing greenhouse gas emissions. Energy efficiency practices can also enhance building performance and in turn improve thermal comfort for occupants. Energy efficiency measures incorporated in the project are detailed below.

- The development is all-electric; no gas connections will be provided.
- A highly insulated and thermally efficient building envelope, including thermal breaks in external walls, is proposed.
- Each dwelling will achieve a NatHERS rating ≥ 7 -stars, complying with 55.05-7 Energy Efficiency for apartment development objectives.
- Each dwelling will achieve a cooling load ≤ 21 MJ/m², complying with 55.05-7 Energy Efficiency for apartment development objectives.
- At least 20% of the roof area will be left clear for installation of a solar PV system. A minimum 0.5 kW solar PV system will be installed per dwelling.
- Efficient LED light fittings will be installed.
- External lighting will be sensor-controlled for energy efficiency.
- North facing windows are shaded by eaves, fixed horizontal shading devices or fixed awnings with a minimum horizontal depth of 0.25 times the window height. Refer to architectural drawings.

3.3 WATER EFFICIENCY

Installing water efficient fixtures allow us to reduce potable water consumption during operation and in turn reduce associated water cost. The development is installing appliances and fixtures shown below to enable water efficient practices by building occupants.

- Toilets: 4 Star.
- Taps (kitchen and bathroom): 5 Star.
- Showerheads: 3 Star.

Refer to architectural specifications for water fixture selections.

For each townhouse a 2kL rainwater tank will be installed capturing water runoff from the roof areas only and will be used for toilet flushing.

For the apartments, a 30kL rainwater tank will be installed capturing water runoff from the roof areas only and will be used for toilet flushing and landscape irrigation.

3.4 STORMWATER

Better Stormwater practices are in-place to reduce the impact of stormwater runoff, improve its water quality, achieve best practice stormwater management outcomes, and incorporate water-sensitive urban design principles. The following items below are met to ensure better stormwater practices and meet Clause 55.05-1 Permeability and stormwater management objective:

- Stormwater post development flow rates must be $\leq$ predevelopment flow rates.
- The development includes a stormwater management system designed to meet the best practise quantitative performance objectives for stormwater quality specified in the Urban stormwater management guidance (EPA Publication 1739.1,2021) by meeting the targets below
 - 80% reduction in mean annual load of suspended solids.
 - 45% reduction in mean annual load of total phosphorous and total nitrogen.
 - 70% reduction in mean annual load of litter.
- The stormwater management system must be designed to direct flow of stormwater into treatment areas, garden areas, tree pits and permeable surfaces, with drainage of residual flows to LPOD.

Refer to Civil Stormwater Management Plan for compliance with 2.4 Stormwater items above, as required by 55.05-1 Permeability and stormwater management objective.

3.5 BUILDING MATERIALS & CONSTRUCTION WASTE

Sourcing environmentally friendly building materials helps minimise the environmental impacts associated with the manufacturing, transport, and use of construction materials. The environmentally responsible practices outlined below contribute to reducing the overall environmental footprint of both the building's construction and its ongoing operation.

- Where deemed feasible, locally sourced materials will be used for construction, reducing transport emissions.
- All insulants will have a zero Ozone Depleting Potential (ODP).
- At least 80% of construction waste will be recycled diverted from landfill.

3.6 WASTE AND RECYCLING OBJECTIVES

The development will be designed to allow for convenient and responsible disposal of waste. The Waste Management Plan produced by the engaged waste consultant will cover the items mentioned below.

- The development bin storage area will allow for assorted disposal of general waste, recycling, Food and Garden waste (FOGO) and mixed and glass recycling in-line with Clause 55.05-5 requirements. Refer to *Figure 2* below shown in the architectural drawings.
- Shared bin storage area to be at least 29m² in area and have a minimum depth of 1.0m and minimum height of 2.7m, as required by Table B5-5.2 Apartment Bin Storage. Refer to *Figure 2* below showing the bin storage area meeting this requirement.
- The shared bin storage area must include a tap and drain for bin washing.
- A continuous path of travel is provided from each dwelling to bin storage areas. Refer to architectural drawings.
- Each dwelling includes an internal waste and recycling storage space of at least 0.07 cubic metres with a minimum depth of 250 millimetres. (Refer Architectural drawings)

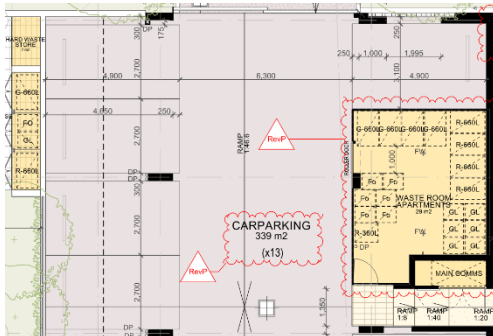


Figure 2 Waste room (29m²)

3.7 URBAN ECOLOGY

Enhancing a sites urban ecology will protect and enhance biodiversity and provide sustainable landscaping which will create a more resilient, liveable and ecologically balanced urban environment. The development incorporates the following strategies to enhance urban ecology.

- Permeable landscaping will cover at least 20% of the site, contributing to biodiversity and local ecology. Refer to *Figure 3* showing 1,131m² of the landscape space on the 3,693m² site area (31%).
- External lighting will be designed to minimise light spill and avoid upward light pollution.

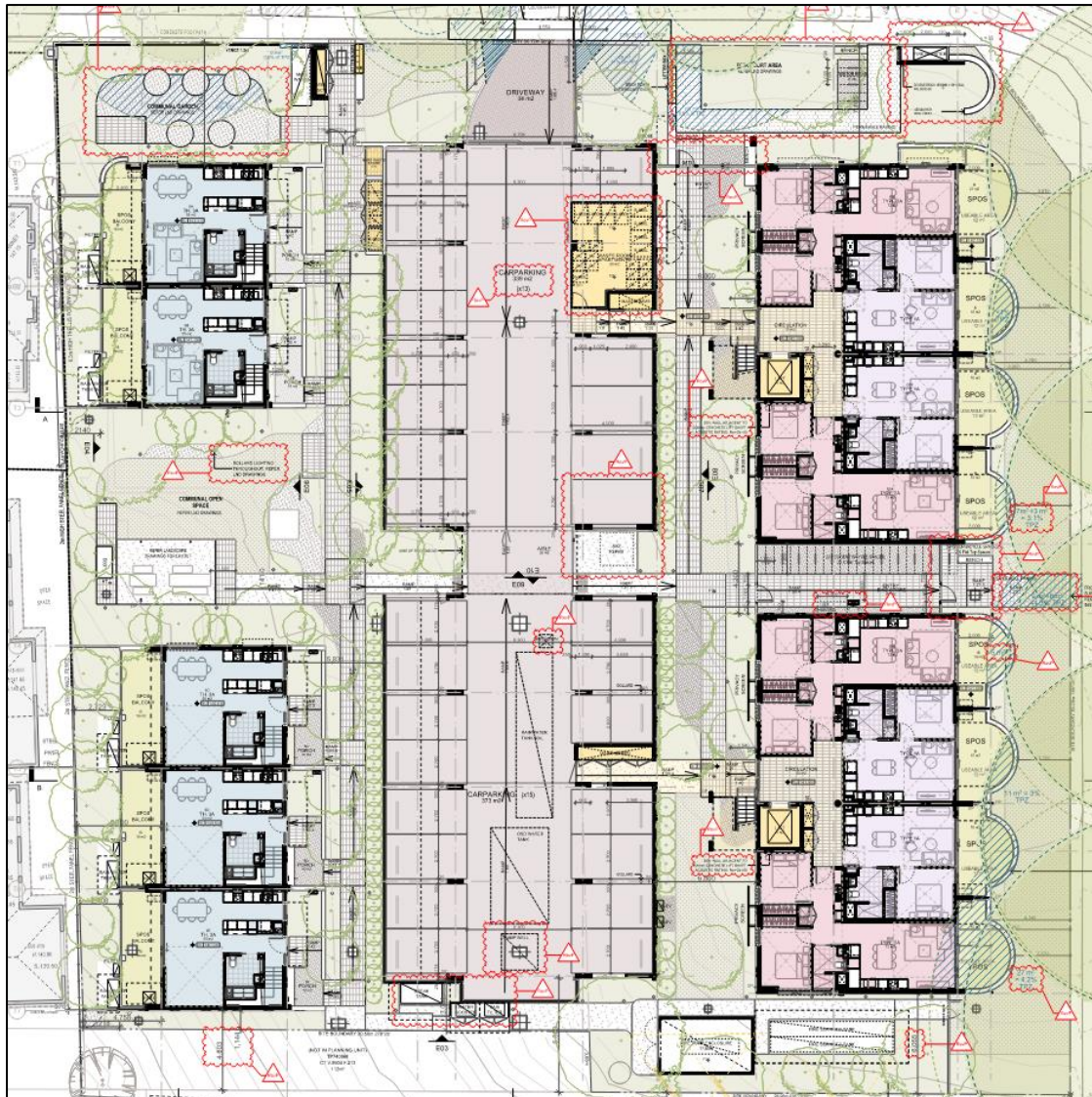


Figure 3 - 31% of the site is covered in landscape area.

4 PRELIMINARY NATHERS ASSESSMENT

4.1 CLASS 2 NATHERS

The following section summaries the preliminary NatHERS results for the Class 2 section of the project.

4.1.1 THERMAL ENVELOPE

For Class 2 buildings, the thermal envelope includes external walls, roofs, floors, glazing, and doors, as well as intertenancy walls, floors and ceilings that separate conditioned spaces from unconditioned areas or external conditions. NCC 2022 requires that these elements be designed to reduce unwanted heat loss and gain, improving thermal comfort and energy efficiency.

The following primary thermal construction details are proposed based on the preliminary assessment:

Table 2 Class 2 thermal construction details

BUILDING ELEMENT	THERMAL CONSTRUCTION DETAIL
Roof	$R_M 5.0$ insulation
External Walls	$R_M 2.7$ insulation + thermal break at studs
Party Walls Between Dwellings / Corridor	$R_M 2.0$ insulation
Suspended Floor	$R_M 2.3$ insulation
Slab Edge	N/A
Awning Window	LowE Double glazed – $U_W = 2.70$, $SHGC_W = 0.23$
Fixed Window	LowE Double glazed – $U_W = 1.80$, $SHGC_W = 0.30$
Casement Window	LowE Double glazed – $U_W = 2.50$, $SHGC_W = 0.23$
Sliding Door	LowE Double glazed – $U_W = 2.30$, $SHGC_W = 0.26$
Ceiling Fans	Ceiling fans required for level 2 living rooms

R_M is the R-Value of the added insulation material.

U_W is total U-Value of the window element, including glazing and frame.

$SHGC_W$ is total Solar Heat Gain Coefficient of the window element including glazing and frame.

The calculation of the required total R-Value (R_T) and total system U-Value (U_W) has considered thermal bridging as per NCC requirements. Therefore, the required added insulation R-Value (R_M) can be considerably higher than the total construction R-Value (R_T).

4.1.2 NATHERS ASSESSMENT & RESULTS

Based on the thermal envelope mentioned above, the following NatHERS results have been achieved. The results demonstrate compliance with the targets set for the project to meet NCC and Council's requirements.

Table 3 Class 2 NatHERS results

	Dwelling	Heating (MJ/m ² yr)	Cooling (MJ/m ² yr)	Total (MJ/m ² yr)	Rating
GF	Dwelling 01	46.1 MJ/m ²	2.9 MJ/m ²	49.0 MJ/m ²	8.4
	Dwelling 02	43.3 MJ/m ²	5.0 MJ/m ²	48.3 MJ/m ²	8.4
	Dwelling 03	42.6 MJ/m ²	5.2 MJ/m ²	47.8 MJ/m ²	8.4
	Dwelling 04	68.0 MJ/m ²	2.2 MJ/m ²	70.2 MJ/m ²	7.6
	Dwelling 05	64.4 MJ/m ²	2.3 MJ/m ²	66.6 MJ/m ²	7.7
	Dwelling 06	43.2 MJ/m ²	4.9 MJ/m ²	48.1 MJ/m ²	8.4
	Dwelling 07	42.6 MJ/m ²	5.1 MJ/m ²	47.8 MJ/m ²	8.4
	Dwelling 08	69.4 MJ/m ²	2.5 MJ/m ²	72.0 MJ/m ²	7.5
L1	Dwelling 01	34.7 MJ/m ²	5.6 MJ/m ²	40.3 MJ/m ²	8.8
	Dwelling 02	26.5 MJ/m ²	8.3 MJ/m ²	34.8 MJ/m ²	8.9
	Dwelling 03	26.9 MJ/m ²	8.4 MJ/m ²	35.3 MJ/m ²	8.9
	Dwelling 04	55.7 MJ/m ²	5.4 MJ/m ²	61.1 MJ/m ²	7.9
	Dwelling 05	51.5 MJ/m ²	5.7 MJ/m ²	57.2 MJ/m ²	8.1
	Dwelling 06	26.4 MJ/m ²	8.4 MJ/m ²	34.7 MJ/m ²	8.9
	Dwelling 07	26.7 MJ/m ²	8.3 MJ/m ²	35.0 MJ/m ²	8.9
	Dwelling 08	52.5 MJ/m ²	5.6 MJ/m ²	58.1 MJ/m ²	8
	Dwelling 09	76.1 MJ/m ²	4.6 MJ/m ²	80.7 MJ/m ²	7.2
	Dwelling 10	50.4 MJ/m ²	7.3 MJ/m ²	57.7 MJ/m ²	8.1
	Dwelling 11	50.2 MJ/m ²	7.4 MJ/m ²	57.6 MJ/m ²	8.1
	Dwelling 12	70.5 MJ/m ²	5.0 MJ/m ²	75.5 MJ/m ²	7.4
	Dwelling 13	78.8 MJ/m ²	4.3 MJ/m ²	83.0 MJ/m ²	7.1
	Dwelling 14	51.1 MJ/m ²	7.5 MJ/m ²	58.6 MJ/m ²	8
	Dwelling 15	51.5 MJ/m ²	6.9 MJ/m ²	58.3 MJ/m ²	8
	Dwelling 16	47.2 MJ/m ²	5.4 MJ/m ²	52.6 MJ/m ²	8.3
L2	Dwelling 01	46.8 MJ/m ²	11.5 MJ/m ²	58.3 MJ/m ²	8
	Dwelling 02	43.9 MJ/m ²	15.3 MJ/m ²	59.2 MJ/m ²	7.9
	Dwelling 03	44.8 MJ/m ²	16.2 MJ/m ²	60.9 MJ/m ²	7.9
	Dwelling 04	60.4 MJ/m ²	11.7 MJ/m ²	72.1 MJ/m ²	7.4
	Dwelling 05	51.3 MJ/m ²	12.4 MJ/m ²	63.7 MJ/m ²	7.8
	Dwelling 06	44.0 MJ/m ²	15.5 MJ/m ²	59.6 MJ/m ²	7.9
	Dwelling 07	43.9 MJ/m ²	16.2 MJ/m ²	60.1 MJ/m ²	7.9
	Dwelling 08	59.1 MJ/m ²	11.9 MJ/m ²	71.0 MJ/m ²	7.5
	Dwelling 09	62.7 MJ/m ²	12.0 MJ/m ²	74.7 MJ/m ²	7.4
	Dwelling 10	44.9 MJ/m ²	17.0 MJ/m ²	61.9 MJ/m ²	7.9
	Dwelling 11	43.9 MJ/m ²	16.2 MJ/m ²	60.1 MJ/m ²	7.9
	Dwelling 12	52.6 MJ/m ²	12.3 MJ/m ²	64.9 MJ/m ²	7.8
	Dwelling 13	60.6 MJ/m ²	12.0 MJ/m ²	72.7 MJ/m ²	7.4
	Dwelling 14	44.6 MJ/m ²	17.1 MJ/m ²	61.7 MJ/m ²	7.9
	Dwelling 15	44.7 MJ/m ²	16.2 MJ/m ²	60.9 MJ/m ²	7.9
	Dwelling 16	50.0 MJ/m ²	12.3 MJ/m ²	62.3 MJ/m ²	7.9
Average		49.9 MJ/m ²	9.0 MJ/m ²	58.9 MJ/m ²	8.0
Minimum		26.4 MJ/m ²	2.2 MJ/m ²	34.7 MJ/m ²	7.1
Maximum		78.8 MJ/m ²	17.1 MJ/m ²	83.0 MJ/m ²	8.9

4.1.3 WHOLE OF HOME

The Whole of Home (WoH) approach is integral to the NatHERS assessment process under NCC 2022. WoH considers the entire home's energy performance, including heating, cooling, lighting, and other operational energy uses. This holistic perspective ensures that all elements of the home, works together to achieve minimum energy efficiency and sustainability outcomes.

Table 4 Class 2 WoH minimum requirements

WoH REQUIREMENTS	
CATEGORY	MINIMUM NCC WOH REQUIREMENTS
Heating ZERL Star Rating	3.0 Star
Cooling ZERL Star Rating	3.0 Star
Hot Water	Electric Instantaneous
Cooking Stove Top	Electric
Cooking Oven	Electric
Lighting Density	4 W/m ²
Solar Array Capacity per Dwelling	0.5kW
Solar Inverter Capacity per Dwelling	0.38kW

ZERL is Zoned Energy Rating Label.

The Whole of Home (WoH) minimum requirements outlined in Table 2 must be met to achieve the WoH scores detailed in Table 1.

NOTE

This preliminary house energy rating assessment is prepared only for the purpose for demonstrating that the development, as currently designed, is on track to meet the relevant regulatory targets as outlined by the BCA.

There is still significant design development to occur. As such, the construction details used within the assessment are not to be interpreted as a commitment to the final detailing that the development will use. The developer and design and construction teams reserve the right to modify the construction detailing as appropriate, within the general commitment that the development will meet the house energy rating performance targets as outlined in the "House Energy Rating Targets" section above.

4.2 CLASS 1A NATHERS

The following section summaries the preliminary NatHERS results for the Class 1a section of the project.

4.2.1 THERMAL ENVELOPE

For Class 1a buildings, the thermal envelope includes external walls, roofs, floors, glazing, and doors, as well as intertenancy walls, floors and ceilings that separate conditioned spaces from unconditioned areas or external conditions. NCC 2022 requires that these elements be designed to reduce unwanted heat loss and gain, improving thermal comfort and energy efficiency.

The following primary thermal construction details are proposed based on the preliminary assessment:

Table 5 Class 1a NatHERS results

BUILDING ELEMENT	THERMAL CONSTRUCTION DETAIL
Roof	$R_{M6.0}$ insulation
External Walls	$R_{M2.7}$ insulation + thermal break at studs
Party Walls Between Dwellings	$R_{M2.0}$ insulation
Suspended Floor	$R_{M2.3}$ insulation
Slab Edge	N/A
Awning Window	LowE Double glazed – $U_w = 2.70$, $SHGC_w = 0.23$
Fixed Window	LowE Double glazed – $U_w = 1.80$, $SHGC_w = 0.30$
Casement Window	LowE Double glazed – $U_w = 2.50$, $SHGC_w = 0.23$
Sliding Door	LowE Double glazed – $U_w = 2.30$, $SHGC_w = 0.26$

R_M is the R-Value of the added insulation material.

U_w is total U-Value of the window element, including glazing and frame.

$SHGC_w$ is total Solar Heat Gain Coefficient of the window element including glazing and frame.

The calculation of the required total R-Value (R_T) and total system U-Value (U_w) has considered thermal bridging as per NCC requirements. Therefore, the required added insulation R-Value (R_M) can be considerably higher than the total construction R-Value (R_T).

4.2.2 NATHERS ASSESSMENT & RESULTS

Based on the thermal envelope mentioned above, the following NatHERS results have been achieved. The results demonstrate compliance with the targets set for the project to meet NCC and Council's requirements.

Table 6 Class 1a NatHERS results

Dwelling	Heating (MJ/m ² yr)	Cooling (MJ/m ² yr)	Total (MJ/m ² yr)	Rating	WoH
TH1	63.1 MJ/m ²	11.0 MJ/m ²	74.1 MJ/m ²	7.4	66
TH2	71.9 MJ/m ²	8.5 MJ/m ²	80.4 MJ/m ²	7.2	65
TH3	62.7 MJ/m ²	10.6 MJ/m ²	73.3 MJ/m ²	7.4	66
TH4	60.9 MJ/m ²	9.0 MJ/m ²	69.9 MJ/m ²	7.6	66
TH5	72.1 MJ/m ²	8.7 MJ/m ²	80.9 MJ/m ²	7.2	65

Average	66.1 MJ/m ²	9.6 MJ/m ²	75.7 MJ/m ²	7.4
Minimum	60.9 MJ/m ²	8.5 MJ/m ²	69.9 MJ/m ²	7.2
Maximum	72.1 MJ/m ²	11.0 MJ/m ²	80.9 MJ/m ²	7.6

4.2.3 WHOLE OF HOME

The Whole of Home (WoH) approach is integral to the NatHERS assessment process under NCC 2022. WoH considers the entire home's energy performance, including heating, cooling, lighting, and other operational energy uses. This holistic perspective ensures that all elements of the home, works together to achieve minimum energy efficiency and sustainability outcomes.

Table 7 Class 1a WoH minimum requirements

WoH REQUIREMENTS	
CATEGORY	MINIMUM NCC WOH REQUIREMENTS
Heating ZERL Star Rating	3.0 Star
Cooling ZERL Star Rating	3.0 Star
Hot Water	Heat Pump (Peak)
Cooking Stove Top	Electric
Cooking Oven	Electric
Lighting Density	4 W/m ²
Solar Array Capacity per Dwelling	1.0kW
Solar Inverter per Dwelling	0.75kW

ZERL is Zoned Energy Rating Label.

The Whole of Home (WoH) minimum requirements outlined in Table 2 must be met to achieve the WoH scores detailed in Table 1.

NOTE

This preliminary house energy rating assessment is prepared only for the purpose for demonstrating that the development, as currently designed, is on track to meet the relevant regulatory targets as outlined by the BCA.

There is still significant design development to occur. As such, the construction details used within the assessment are not to be interpreted as a commitment to the final detailing that the development will use. The developer and design and construction teams reserve the right to modify the construction detailing as appropriate, within the general commitment that the development will meet the house energy rating performance targets as outlined in the “House Energy Rating Targets” section above.

APPENDIX – A VOC LIMITS

VOC LIMITS – PAINTS, ADHESIVES & SEALANTS

PRODUCT CATEGORY	MAX. TVOC (g/L OF READY TO USE PRODUCT)
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 and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

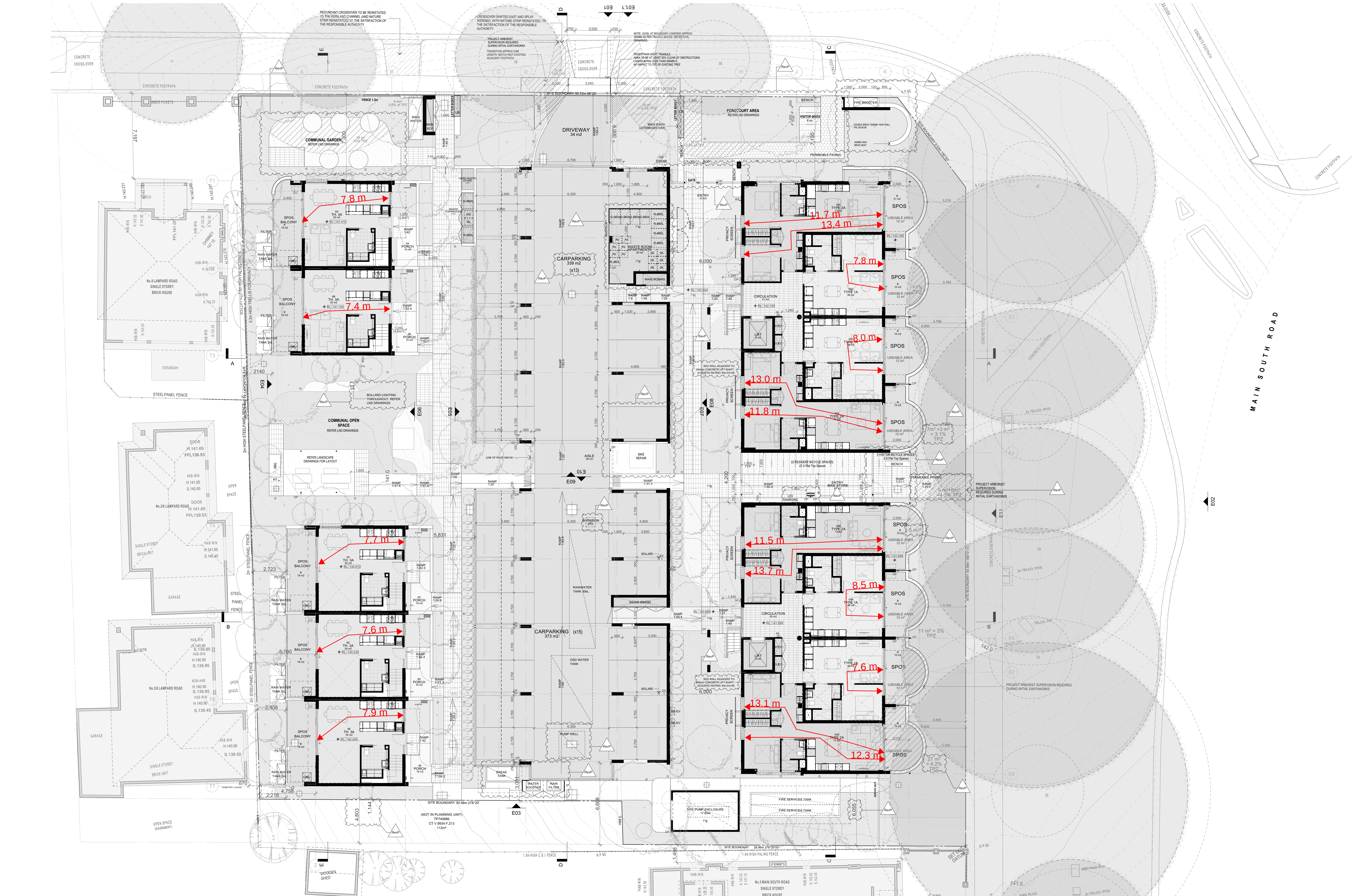
VOC LIMITS – CARPETS

COMPLIANCE OPTIONS	COMPLIANCE CRITERIA
A – PRODUCT CERTIFICATION	The product is certified under a recognised Product Certification Scheme (listed on the GBCA website under Green Star resources) or other recognised standards. The certificate must be current at the time of project registration or submission and list the relevant product name and model.
B – LABORATORY TESTING	<u>ASTM D5116:</u> - Total VOC limit: 0.5mg/m ² per hour, & - 4-PC limit: 0.05mg/m ² per hour <u>ISO 16000 / EN 13419:</u> - TVOC at three days: 0.5mg/m ² per hour <u>ISO 10580 / ISO/TC 219 (Document N238):</u> - TVOC at 24 hours: 0.5mg/m ² per hour

FORMALDEHYDE LIMITS

TEST PROTOCOL	EMISSION LIMIT/ UNIT OF MEASUREMENT
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m ² hr
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m ² hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m ² hr (at 3 days)
ASTM D6007	≤0.12mg/m ³
ASTM E1333	≤0.12mg/m ³
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m ³
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m ² hr

APPENDIX B – BREEZE PATH DIAGRAM



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This drawing is to be read in conjunction with the following Contract documents, details and specifications and any other written instructions issued during the course of the Contract.

The Contractor shall verify all dimensions on site prior to commencing any shop drawings. Typical dimensions shall take precedence over scaled. Scaled dimensions shall be verified on site.

