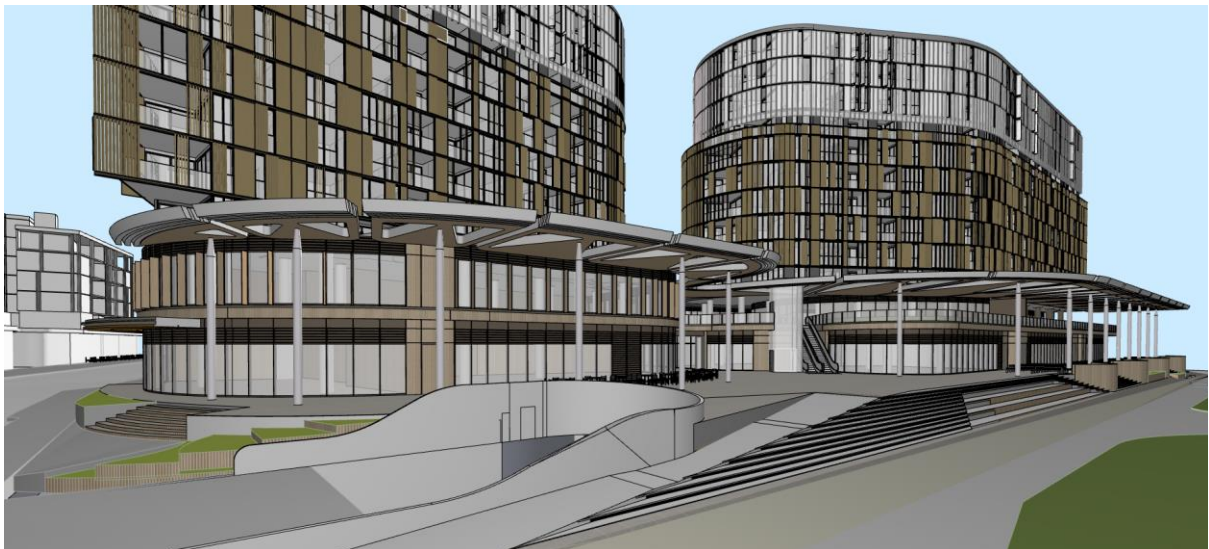


CROWN GROUP

EASTLAKES TOWN CENTRE SOUTH SITE BASIX AND ESD

OCTOBER 2019

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EXECUTIVE SUMMARY

An ESD strategy has been developed for the proposed South Site in the Eastlakes Town Centre Development. The South Site comprises of Buildings D, E, F, G and J. This report demonstrates how the development meets the statutory requirements for single occupancy dwellings under Section J and BASIX and describes how best practice ESD principles will be incorporated in the design of the development.

BASIX requires different benchmarks to be met according to the size of the building. The following benchmarks apply to the Buildings on the south site of Eastlakes Town Centre:

- Water—Minimum target of 40% potable water use reduction compared to the NSW average for all buildings
- Thermal comfort—Meeting a set of NatHERS modelled maximum heating and cooling loads determined by the BASIX tool according to the development type and climate zone. For this development, the thresholds are as follows:

BUILDING	HEATING		COOLING	
	Average Maximum MJ/m ²	Maximum per dwelling MJ/m ²	Average Maximum MJ/m ²	Maximum per dwelling MJ/m ²
E, F and G	51	66	45	59
D and J	40	45.4	26	29.5

- Energy —Minimum required target of 25% energy consumption reduction compared to the NSW average for buildings D and J
- Energy—Minimum required target of 20% energy consumption reduction compared to the NSW average for buildings E and F
- Energy—Minimum required target of 30% energy consumption reduction compared to the NSW average for building G

Water efficiency in the building has been achieved through the following:

- Water efficient fittings
- Supply of harvested rainwater for use in irrigation

NatHERS modelling has been conducted to demonstrate thermal comfort performance of the residential dwellings, and the results of this modelling demonstrate that the architectural design can manage thermal loads within the apartments to meet the minimum benchmark for this location.

Energy consumption in multi-unit residential buildings is heavily influenced by the utilisation and servicing of the common areas. HVAC and artificial lighting systems in the basement and lobbies has been carefully designed to reduce energy demands.

Simple energy efficiency measures, such as the provision of efficient fitting and fixtures will deliver energy consumption reductions in the dwellings. These include:

- Efficient DHW heating systems
- Lighting will consist of dedicated low energy light fittings with efficient controls to limit unnecessary usage
- High Energy Star-rated appliances will be installed in each apartment

1 INTRODUCTION

An ESD strategy has been developed for the proposed Buildings D, E, F, G and J in the South site of the Eastlakes Town Centre development. This report demonstrates how the development meets the statutory requirements for single occupancy dwellings under Section J and describes how best practice ESD principles will be incorporated in the design of the development.

1.1 BASIX

BASIX is an online tool that is used to rate the energy and water efficiency and thermal comfort performance of residential dwellings in NSW. The tool sets minimum energy and water reduction targets which must be met through the design of the building and the selection of fixtures and fittings.

BASIX applies to all new dwellings including single dwellings, townhouses and low-rise, mid-rise and high-rise developments in NSW. BASIX also applies to all residential alterations and additions with a total cost of works of \$100,000 or more; and all residential developments with a total estimated cost of works of \$50,000 or more.

Design inputs including location, size, construction and glazing materials, water sources, equipment and fittings are used to determine the potential energy and water consumption of a new home or dwelling.

BASIX assesses three main categories:

1. Water;
2. Thermal Comfort;
3. Energy.

Thermal comfort is assessed by simulation in accordance with the Nationwide House Energy Rating Scheme (NatHERS) modelling protocol. This requires the modelling of each assessable dwelling by an accredited assessor, working with NatHERS accredited software.

NatHERS modelling assesses the potential of the dwelling to provide thermal comfort passively, thereby reducing energy requirements for heating and cooling. The annual heating and cooling loads calculated are entered into the BASIX tool to determine if the dwelling satisfies the maximum heating and cooling loads set for the dwelling in its climate zone.

The heating and cooling loads also affect the 'Energy' score, with more efficient dwellings contributing to an improved score in the 'Energy' section. The 'Energy' score is also affected by other inputs such as efficiency of appliances, heating and cooling system selection, hot water systems and factors such as use of renewable energy systems.

1.1.1 SOURCES OF INFORMATION

This BASIX assessment has relied on the following documentation for inputs and methodology

- Architectural drawings from FJMT as shown below. All drawings are dated 11/10/19 and the Revision is M01.

Table 1: Architectural drawings used

DRAWINGS
Basement 1
Basement 2
Basement 3
Basement 4
Ground Level
Level 1 Lower Podium
Level 2 Upper Podium
Level 3
Level 4
Level 5
Level 6
Level 7
Level 8
Level 9
Level 10
Level 11
Roof Plan
East and West Elevation
North and South Elevations
Longitudinal Section
Cross Section

- Correspondence with FJMT
- Correspondence with Crown

- NatHERS Technical Note 1 – Principles for Ratings in Regulation Mode version 1.2 – 2014
- BASIX Thermal Comfort Protocol 01 December 2014 (Amendment No. 4: 01 February 2016)
- BASIX Thermal Comfort Protocol 01 July 2017

1.1.2 ACCREDITED NATHERS SIMULATION SOFTWARE

FirstRate5 is provided by Sustainability Victoria and is accredited for simulating the thermal performance of dwellings in Australian climates under the NatHERS software accreditation protocol.

FirstRate5 version 5.2.10b(3.13) has been used in the assessment of this project, in accordance with the NatHERS Technical Note and the BASIX Thermal Comfort Protocol.

Inputs including dwelling geometry, space uses, orientation, climate zone, building materials and shading from adjacencies and obstructions are used to calculate heating and cooling loads for the dwelling. Resulting loads that are within the heating and cooling thresholds set under the BASIX protocol will satisfy the thermal comfort targets of BASIX.

1.2 LIMITATIONS

The results from the NatHERS modelling shown within this report are limited in accuracy by factors including the following:

- Actual energy consumption will be affected by variations in the climate, installed equipment, occupants and their behaviour which modelling does not account for;
- Construction details being consistent with the design documentation provided;
- Orientation and apartment layout being as shown on the drawings.

1.3 APPLICATION OF SECTION J OF THE NATIONAL CONSTRUCTION CODE VOLUME 1

The thermal performance requirements for a building's envelope are addressed through the first three parts of Section J – Energy Efficiency of the National Construction Code (NCC):

- Part J1 – Building Fabric and Glazing
- Part J2 – No longer used
- Part J3 – Building Sealing

The residential part of this project is regulated under BASIX for energy efficiency.

For each Sole Occupancy Unit (SOU) of a Class 2 building, BASIX satisfies Parts J1 and J3.

The prescriptive provisions of Parts J1 and J3 are therefore not directly applicable to each SOU. The relevant Performance Requirements have been stated as the maximum thermal comfort heating and cooling loads stipulated by BASIX.

The Class 2 parts of the building that are not SOUs must satisfy the prescriptive provisions of Parts J1 and J3.

The architect must take responsibility for specifying the Performance Requirements of the building fabric, glazing and building sealing performance, as required under BASIX, including those non-SOU parts of the building.

The relevant consultant(s) must take responsibility for specifying the Performance Requirements of the mechanical and electrical services design, as required under the relevant parts of Section J.

The Class 6 Retail areas and Class 9b childcare must comply with the requirements of Section J of the NCC 2019.

An assessment of section J compliance using JV3 modelling has been completed for the retail and childcare areas of the development which demonstrates the current design has the potential to meet Section J requirements.

The conditioned common areas in the residential parts of the buildings were also assessed using the Deemed to Satisfy provisions. This assessment shows the development has the potential to meet Section J energy efficiency requirements under Parts J1 Building Fabric and glazing.

A detailed assessment will be undertaken during Detailed Design to assess the most suitable glazing products and insulation levels.

2 BASIX

The purpose of the BASIX analysis is to benchmark the proposed development against average NSW residential performance parameters, including:

- Water
- Thermal comfort
- Energy

BASIX requires the following benchmarks to be met:

- Water—Minimum target of 40% potable water use reduction compared to the NSW average
- Thermal comfort—Meeting a set of NatHERS modelled maximum heating and cooling loads determined by the BASIX tool according to the development type and climate zone.
- Energy —Minimum required target of 25% energy consumption reduction compared to the NSW average for buildings D and J
- Energy—Minimum required target of 20% energy consumption reduction compared to the NSW average for buildings E and F
- Energy—Minimum required target of 30% energy consumption reduction compared to the NSW average for building G

The BASIX certificate(s) for the development are included in Appendix A-1.

2.1 WATER

Water efficiency in the building has been achieved through the following:

- Water efficient fittings as shown in the table below:

Table 2: Water fixtures performance

FITTING	WELS RATING
Toilet	4 Star
Bathroom taps	5 Star
Kitchen taps	5 Star
Showers	3 Star (more than 6L/min but less than 7.5L/min)
Dishwashers	4 Star
Washing machines	2 Star

- Native and low water use plant species have been selected for all landscaping in the building
- Harvested rainwater will be collected in a 100kL rainwater tank (common tank from North and South sites) to provide water to irrigation around the site. Rainwater will also be used in car wash bays.

2.2 THERMAL COMFORT

Thermal comfort (NatHERS) modelling is employed in accordance with the BASIX protocol, to determine heating and cooling loads attributed to achieving acceptable thermal comfort in each dwelling. The results of NatHERS modelling demonstrate that the architectural design can manage thermal loads within the apartments to meet the minimum benchmark for this location.

The maximum allowable thermal loads for a development in this location are those shown in Table 3. The average thermal loads achieved in this development are shown in the same table for comparison.

Table 3: NatHERS thermal comfort performance

BUILDING	HEATING		COOLING	
	Average Maximum MJ/m ²	Maximum per dwelling MJ/m ²	Average Maximum MJ/m ²	Maximum per dwelling MJ/m ²
Maximum load set by BASIX for E, F and G	51	66	45	59
Average load achieved for E, F and G	35.3		23.6	
Maximum load set by BASIX for D and J	40	45.4	26	29.5
Average load achieved for D and J	37.5		20.4	

2.2.1 MODELLING INPUTS

This section identifies the inputs for windows, shading and constructions used for the NatHERS modelling.

GLAZING

Table 4 identifies the glazing properties (window total values only) used in the NatHERS models.

Table 4: Glazing properties

GLAZING OPERABILITY	U-VALUE (WHOLE WINDOW)	SHGC (WHOLE WINDOW)
Sliding doors and fixed windows	4.8	0.59
Awning Windows	4.8	0.51
Skylights building F - Single glazed clear	7.3	0.79

SHADING

Shading of the external building fabric alters the impact of solar loads on the internal conditions of each dwelling. NatHERS modelling accounts for sources of fixed shading that can impact each dwelling.

Note that models have accounted for the following:

- The overhang of any balconies above each dwelling;
- Overshadowing from adjacent buildings; and
- Projecting balcony separator walls and other 'wing-wall'-type geometry between dwellings.

Holland blinds have been modelled as required by the NatHERS protocol, but are not required to be installed as part of the development.

CONSTRUCTIONS

Table 5 identifies the wall, floor, ceiling and roof construction properties used as part of the NatHERS models.

Table 5: Construction properties

ELEMENT	MATERIAL / PARAMETER
Construction and Insulation Details	
Ground floor	Minimum 400mm suspended concrete structural slab
Upper floors	200mm suspended concrete slabs
Exposed floors	Floors above open and/or non-conditioned space – R2 added insulation)
External walls	Compressed Fibre Cement Cladding <u>R2.0 added insulation</u>
Party walls between apartments	Aerated autoclaved concrete block with cavity and plasterboard lining
Party walls between apartment and corridor	Aerated autoclaved concrete block with cavity and plasterboard lining <u>R1.0 added insulation</u>
Internal partition walls	Lightweight cavity stud, plasterboard lining
Walls around rises	R1 insulation
Ceilings/Roof	Concrete slab with cavity and plasterboard ceiling lining MEDIUM roof colour <u>R4.0 added insulation</u>
Floor coverings	•Bedrooms, Living/Dining, Study, Hall - carpet •Wet areas - tiles •Kitchen - tiles *Except when drawings indicate tiles for the entire apartment
Shading	All eaves, balconies, balustrades, wall extensions/wing walls, vertical shade louvres and window reveals as shown on plans and elevations.
Downlights	<u>No downlights.</u> Downlights if fitted are to be sealed, with approved non-ventilated downlight covers, allowing for continuous installation of insulation over the fitting without resultant penetrations in the insulation or air transfer to ceiling cavity. An IC-4 fitting rating should be sought in accordance with AS/NZS 60598.2.2
Exhaust Fans	Provision for exhaust fans - 1 per kitchen, laundry, bathroom and ensuite. 150x150 opening, <u>sealed.</u>

2.2.2 MODELLING CONCLUSION

The results of NatHERS modelling demonstrate the apartments can meet the minimum requirements of the Thermal Comfort section of BASIX.

The NatHERS group Universal certificate is included in Appendix A-2.

Stamped drawings for submission in conjunction with the BASIX certificate are included in Appendix A-3.

2.3 ENERGY

2.3.1 COMMON AREAS

Energy consumption in multi-unit residential buildings is heavily influenced by the utilisation and servicing of the common areas. HVAC and artificial lighting systems in car parks, and lobbies need to be carefully designed to reduce energy demands.

The common areas will use:

- Efficient mechanical ventilation systems with appropriate controls to avoid overuse
- Natural ventilation where possible
- High efficacy light fittings
- Lighting control systems in all spaces such as motion sensors or timeclock where appropriate
- Car park mechanical ventilation controlled by carbon monoxide sensors and VSD fans
- A PV array will be included on the roof of the buildings. This array will feed energy into the embedded network for distribution to the site.

Further details of the proposed energy strategy for the common areas of the residential portion of the building are summarised in Table 6.

Table 6: Energy strategies for the common areas

ENERGY ITEM	STRATEGY
Lift motors	Gearless traction with VVVF motors
Lighting	Basement— light emitting diode; Zoned switching with motion sensor Lifts—light emitting diode; Connected to lift call button Garbage rooms—fluorescent; Motion sensors Hallways— light emitting diode; time clock with motion sensor
Ventilation	Basement —ventilation (exhaust only); carbon monoxide monitor + VSD fan Garbage rooms—ventilation exhaust only Hallways—The ground floor lobbies are naturally ventilated. Lobbies on each floor are provided with tempered air from the mechanical ventilation system.

2.3.2 DWELLINGS

Domestic hot water (DHW), space heating and comfort cooling account for up to 60% of the energy use of an average residential dwelling. Targeting these systems as a priority will support the greatest energy consumption reductions. Simple energy efficiency measures, such as the provision of efficient fittings and fixtures can deliver energy consumption reductions.

The dwellings will include the following initiatives:

- Efficient DHW heating systems
- Lighting will consist of dedicated low energy light fittings with efficient controls to limit unnecessary usage
- Clothes drying lines will be installed in each apartment
- Highly efficient cooling and heating systems will be installed in each apartment (see Table 7).

Table 7: Energy strategies for the dwellings

ENERGY ITEM	STRATEGY
Central DHW heating system	High efficiency, gas fired boiler plant
Central cooling system	High efficiency (COP > 4.5), chilled water fan coil units
Central heating system	High efficiency, fan coil + heated water

The Table below lists the appliances that will installed in the apartment and their details on energy performance.

Table 8: Energy performance for appliances

ENERGY ITEM	STRATEGY
Cooktop/over	Gas cooktop, electric oven
Refrigerator	Not provided, <u>ventilated</u> fridge space
Dishwasher	3.5 Star Energy rating
Clothes washers	2.5 Star Energy rating
Clothes dryer	2 Star Energy rating

APPENDIX A-1
BASIX CERTIFICATE

APPENDIX A-2
NATHERS GROUP UNIVERSAL
CERTIFICATE

APPENDIX A-3
BASIX STAMPED DRAWINGS SET