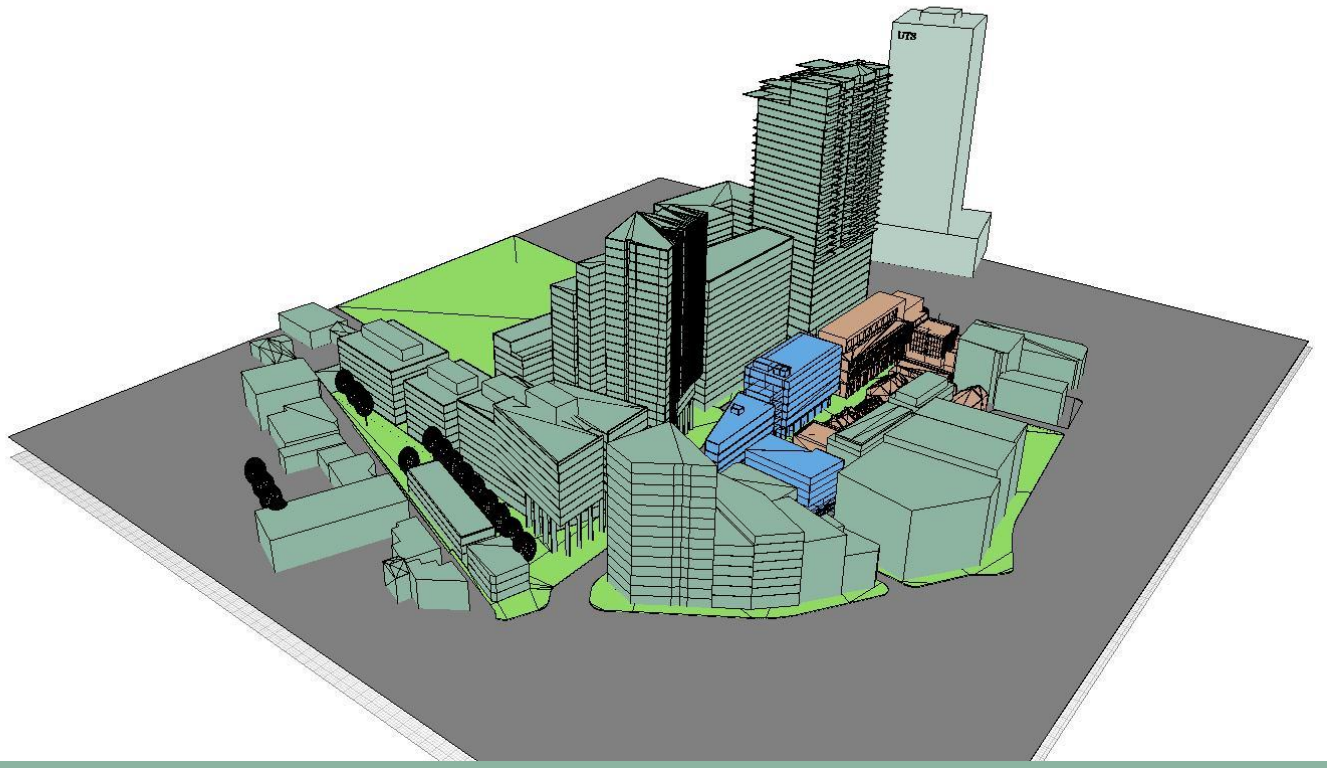

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KENSINGTON STREET PRECINCT
BLOCKS 3B, 3C AND 10

Ecologically Sustainable Development Strategy
Project Application Report

10/04/2012

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	For Issue	Incorporating comments		
Date	10/04/2012	10/04/2012		
Prepared by	KWF	KWF		
Signature				
Checked by	AMD	AMD		
Signature				
Authorised by	RAB	RAB		
Signature				
Project number	SYD1122100	SYD1122100		
Report number				
File reference				

Kensington Street Precinct
Blocks 3B, 3C and 10

Ecologically Sustainable Development Strategy
Project Application Report

10/04/2012

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Executive Summary

The Kensington Street Precinct forms part of the Central Park Development in Chippendale, Sydney.

The Central Park Development master planning approach targets a number of site wide initiatives unique to a precinct development, providing opportunities for ecologically sustainable development (ESD) initiatives unavailable to a standard residential, commercial or retail development. Central to this philosophy has been the development of a Central Thermal Plant (CTP) to cater for the precinct's thermal load, which is in contrast to a traditional building-by-building (decentralised) thermal plant solution.

Since the outset of the design of the Central Park Development, several studies had been compiled in order to determine the optimum CTP configuration. Outcomes from these studies established that the tri-generation system, with the benefit of thermal storage, provided significant added value in terms of environmental performance for the development. This benefit can be quantified by a reduced greenhouse gas (GHG) emissions factor associated with the thermal energy supplied by the CTP when compared to conventional gas (25% lower) or electricity (85% lower) systems.

Another site wide initiative unique to the Central Park Development is the construction a new four-level basement plant building known as the Recycled Water Treatment Plant (RWTP). The plant will treat the site wastewater and will supply recycled water to the CTP and each building within the precinct.

The Kensington Street Precinct consists of Blocks 3A, 3B, 3C, 6, 7 and 10. Blocks 3B, 3C and 10 are to be developed as student accommodation and are the focus of this report.

The ESD initiatives to be implemented for the precinct include:

- Connection to the CTP to supply domestic hot water demands: It is expected that this will provide significant environmental benefit through GHG emissions savings (see above);
- Connection to the RWTP for wastewater treatment and recycled water supply: All wastewater from Blocks 3B, 3C and 10 will be treated through the RWTP. Recycled water will be supplied to the blocks for non-potable uses such as sanitary flushing, laundry use and irrigation;
- Meeting the daylight access and natural ventilation "rules of thumb", as prescribed by the Residential Flat Design Code:
    - A rule of thumb for daylight access is that 70% of living rooms should receive a minimum three hours of direct sunlight between 9am and 3pm in mid-winter. In dense urban areas a minimum of two hours may be acceptable. Through daylight analysis and design planning, the common areas of the buildings have been located and oriented to maximise the daylight access in accordance with this principle;
    - Another rule of thumb for daylight access is to limit the number of single-aspect apartments with a southerly aspect (SW-SE) to a maximum of 10% of the total units proposed. For Blocks 3B, 3C and 10, when combined there are less than 10% of single-aspect apartments with a southerly aspect; and
    - A rule of thumb for natural ventilation is that 60% of residential units should be naturally cross ventilated. By locating the majority of bedroom clusters on the corners of the buildings, and utilising the atrium in Block 3B as a natural ventilation pathway, it is possible to naturally cross ventilate 78% of the apartments in Blocks 3B, 3C and 10.
- Meeting the Deemed-To-Satisfy (DTS) provisions of Section J of the BCA 2011 for the retail area: All new external walls and roofs will meet the DTS provisions stipulated under Part J1 Building Fabric. All glazing has been specified to meet the DTS provisions stipulated under Part J2 Glazing;

- Demonstrating compliance with Section J of the BCA 2011 following the BASIX assessment route for the student accommodation: All units have been modelled using BERS Pro software to demonstrate compliance with the thermal comfort section of BASIX, i.e. NatHERS. Fittings, fixtures and appliances have been specified, where provided, to maximise water and energy efficiency. Connection to the CTP and RWTP further improves the water and energy efficiency of the building. BASIX certificates have been provided in Appendix B; and
- Demonstrating the project meets the principles of a 5 star Green Star rating: Due to the space use mix and spatial differentiation of the blocks, Blocks 3B, 3C and 10 do not meet the eligibility criteria of any pre-existing Green Star tools. Therefore, in order to demonstrate the sustainability aspirations of the project, a 5 star Green Star “principle led” pathway has been established to support the application of ESD initiatives across a full range of environmental categories.

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1 Project Background

The Kensington Street Precinct forms part of the Central Park Development in Chippendale, Sydney. It consists of Blocks 3A, 3B, 3C, 6, 7 and 10. Blocks 3B, 3C and 10 are to be developed as student accommodation and are the focus of this report.

2 Sources of Information

- Tonkin Zulaikha Greer Architectural Layouts, Block 10, dated 23rd March 2012, and Block 3B and C dated 27th March 2012;
- Building Code of Australia 2011;
- GBCA Green Star rating tools and technical manuals for Multi Unit Residential Design v1, Retail Centre Design v1 and Office Design v3; and
- NatHERS rating scheme.

3 Objective

The objective of this report is to provide an overview of the ESD strategies that will be employed for the Kensington Street Precinct student accommodation and retail area of Blocks 3B, 3C and 10. The following ESD initiatives will be discussed:

- Connection to the CTP to supply space heating and domestic hot water demands;
- Connection to the RWTP for wastewater treatment and non-potable water supply;
- Meeting the daylight access and natural ventilation “rules of thumb”, as prescribed by the Residential Flat Design Code, including:
  - Daylight access; and
  - Natural ventilation.
- Meeting the DTS provisions of Section J of the BCA 2011 for the retail areas;
- Demonstrating compliance with Section J of the BCA 2011 following the BASIX assessment route for the student accommodation; and
- Demonstrating the project meets the principles of a 5 star Green Star rating.

4 CTP Connection

The Central Thermal Plant (CTP) being constructed at the Central Park Development has been designed to supply chilled water (CHW) for comfort cooling, and heating hot water (HHW) for space and DHW heating.

The CTP has been optimised to reduce energy and water consumption through the inclusion of a tri-generation system that will reduce reliance on the electricity grid and the utilisation of recycled water from the RWTP to meet the heat rejection requirements, respectively.

CHW and HHW from the CTP will be reticulated around the precinct to individual blocks via an external piping network installed in pre-defined stages. Reticulation routes include buried trench sections and pipework runs exposed within basement levels.

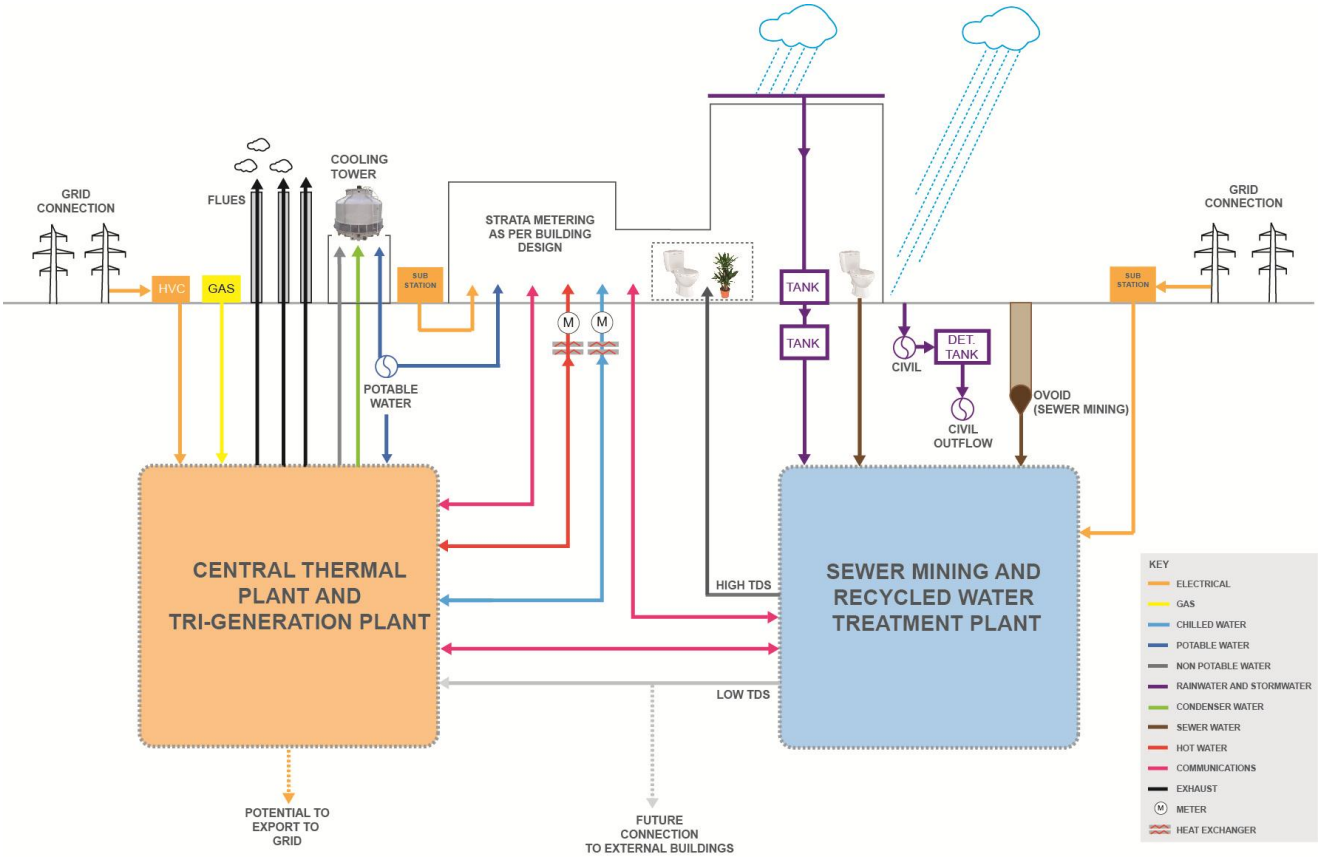


Figure 1: Central Park Development precinct systems and their interaction

For Blocks 3B, 3C and 10, the DHW demand will be met by the CTP. It is expected that this will provide significant GHG emissions savings.

Since the outset of the design of the Central Park Development, several studies had been compiled in order to determine the optimum CTP configuration. Outcomes from these studies established that the tri-generation system, with the benefit of thermal storage, provided significant added value in terms of environmental performance for the development. This benefit can be quantified by a reduced greenhouse gas (GHG) emissions factor associated with the thermal energy supplied by the CTP when compared to conventional gas (25% lower) or electricity (85% lower) systems.

5 RWTP Connection

The RWTP being constructed at the Central Park Development has been designed to treat the site wastewater to supply recycled water to the CTP and each building within the precinct. Any seasonal load will be supplemented by sewer mining from the Sydney Water sewer main which runs through and serves the precinct.

Significant environmental benefit is achieved through a reduction in potable water demand and the minimisation of wastewater discharged to sewer.

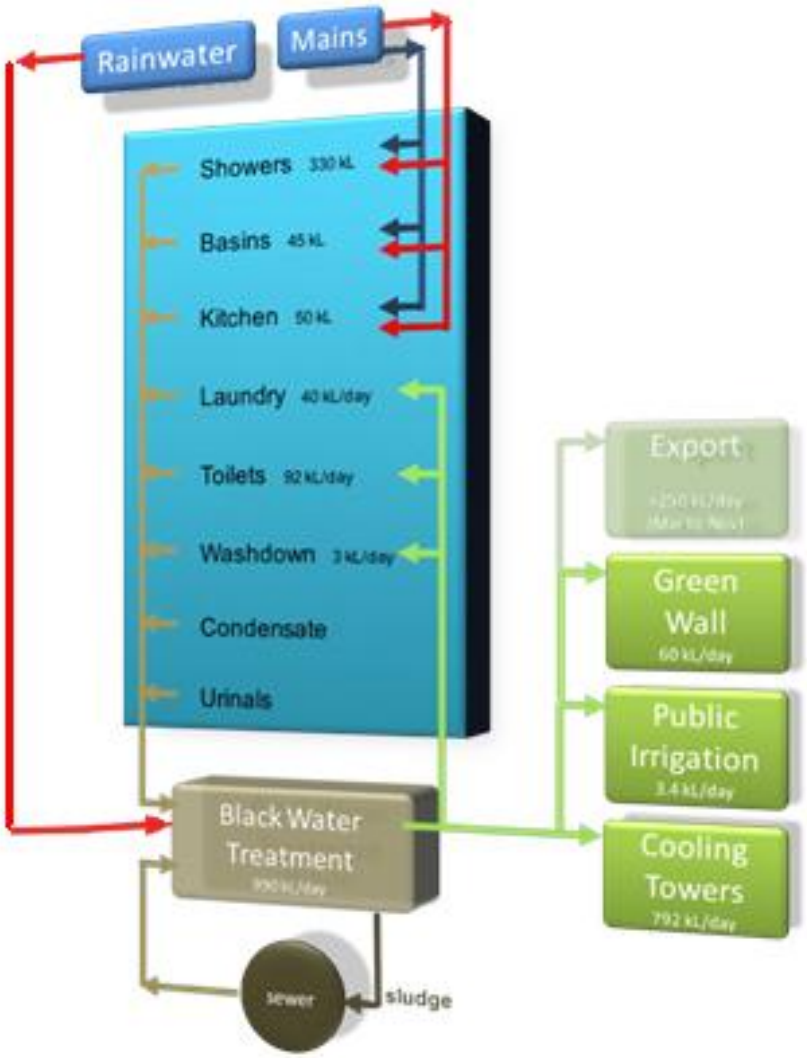


Figure 2: Recycled water flow chart

The RWTP is designed to produce 1ML per day of recycled water to meet the demands detailed in Figure 2. The operational strategy and design characteristics of the plant have been driven by the following water use benchmarks:

- Treating all wastewater produced on site;
- Meeting a minimum 90% of the cooling tower water consumption;
- Meeting a minimum 90% of the irrigation water consumption; and
- Supplying all sanitary flushing, residential washing machines and washdown requirements.

By connecting to this system, the student accommodation of Blocks 3B, 3C and 10 will dramatically reduce potable water demands and minimise wastewater discharged to sewer.

The graph below demonstrates the savings in potable water consumption experienced by the Student Accommodation.

- Standard practice represents water consumption based on current market standard practice fitting efficiencies:
  - Toilets 2 Star WELS rated
  - Taps 3 Star WELS rated
  - Showers 2 Star WELS rated
  - Washing Machines 2.5 Star WELS rated
- Best practice represents the fitting efficiencies used in the Student Accommodation
  - Toilets 4 Star WELS rated
  - Taps 6 Star WELS rated
  - Showers 3 Star WELS rated
  - Washing Machines 4 Star WELS rated
- RWTP represents the savings experienced by the precinct via non-potable water provided from the RWTP for non-potable purposes such as toilet flushing and clothes washing.

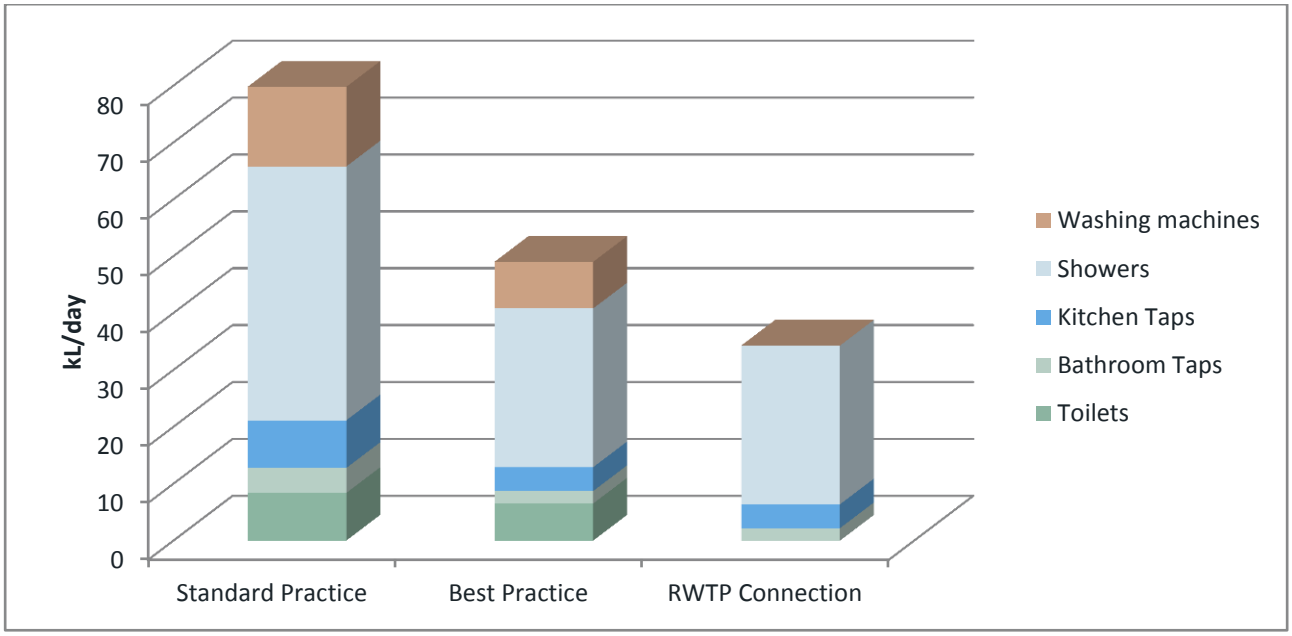


Figure 3: Potable water savings experienced in the student accommodation

6 Good Practice Design

The Kensington Street Precinct student accommodation of Blocks 3B, 3C and 10 is designed to comply with the intent of the daylight access and natural ventilation “rules of thumb”, as prescribed by the Residential Flat Design Code.

6.1 Daylight Access

The Residential Flat Design Code stipulates the following “rules of thumb”:

- 70% of living rooms and private open spaces should receive a minimum three hours of direct sunlight between 9am and 3pm in mid-winter. In dense urban areas a minimum of two hours may be acceptable; and
- Limit the number of single-aspect apartments with a southerly aspect (SW-SE) to a maximum of 10% of the total units proposed.

The following good practice design measures have been implemented to meet the “rules of thumb” defined:

1. The common areas of Blocks 3B and 3C are found in the link portion of the building. A daylight availability study found that these common areas on the upper floors receive three hours of direct sunlight on the eastern elevation between 9am and 3pm in mid-winter, on the lower floors between 2-3 hours of direct sunlight is achieved, which is in line with the dense urban locations allowance;
2. The buildings do not provide private outdoor space for each unit but instead provides a roof top garden area above Block 3 for the use of all occupants. This communal space receives more than 3.5 hours between 9am and 3pm in mid-winter.
3. A daylight availability study found that the common area of Block 10 located in the north west corner of Level 2 receives four hours of direct sunlight on the northern elevation between 9am and 3pm in mid-winter;
4. The common area on Level 1 of Block 10 receives less than 3 hours of direct sunlight in mid winter, however this represents only a small portion of the common spaces for the 3 blocks, therefore the requirement for 70% to meet SEPP 65 is met; and
5. Only 4% of the single-aspect apartments have a southerly aspect.

Appendix E graphically represents the daylight availability.

6.2 Natural Ventilation

The Residential Flat Design Code stipulates the following “rule of thumb”:

- 60% of residential units should be naturally cross ventilated.

By locating the majority of bedroom clusters on the corners of the buildings, and utilising the atrium in Block 3B as a natural ventilation pathway, it is possible to naturally cross ventilate 78% of the apartments in Blocks 3B, 3C and 10.

The following good practice design measures have been implemented to meet the “rule of thumb” defined:

1. The majority of bedroom clusters in Blocks 3B, 3C and 10 are naturally cross ventilated due to their corner locations;
2. The central atrium in Block 3B facilitates natural cross ventilation to the adjacent studio apartments by the provision of ventilation openings to the corridor. Each studio cross-ventilated through to the atrium will have an opening to the corridor which has a minimum 0.225m2 free area. This opening will be acoustically treated to provide acoustic privacy to the apartment as well as being fire rated to ensure fire safety to the occupants.

3. Where bedroom clusters are single-aspect, the provision of ventilation openings to the corridor facilitates natural cross ventilation through openable corridor windows. These openings will be acoustically treated and fire rated as per the openings to the studios.

The result is that 78% of the apartments are naturally cross ventilated.

Figure 4: Natural cross ventilation strategy for Blocks 3B and 3C

Figure 5: Natural cross ventilation strategy for Block 10

7 Section J Compliance

Section J of the BCA 2011 regulates the design and specification of building fabric, glazing and services to promote energy efficiency through operation. Table 1 describes the analysis conducted on each stratum of the blocks to demonstrate compliance with Section J:

Table 1: Section J compliance analysis

Block	Level	Class	Analysis
3B and 3C	Ground Floor	6	Compliance with the DTS provisions of Section J
3B and 3C	1 – 7	3	Compliance with BASIX
10	Ground Floor	6	Compliance with the DTS provisions of Section J
10	1 – 5	3	Compliance with BASIX

7.1 Class 6

The retail areas located on the ground floor of Blocks 3B and 3C, and Block 10 have been assessed against the DTS provisions of Section J. The relevant parts for this assessment are:

- Part J1 Building Fabric; and
- Part J2 Glazing.

7.1.1 Building Fabric

Part J1 outlines the insulation values required for external walls, floors, roofs and roof lights.

In Blocks 3B and 3C, the retail stratum has no roof as there is residential development above all sections of the ceiling. There are also no roof lights.

KSP lies within Climate Zone 5. Within this climate zone, a slab on ground without an in-slab heating system has no minimum R-value requirement. The suspended floor over the basement without an in-slab heating system has a minimum R-value requirement of 1.

External walls of the Block 3 retail construction will have a requirement for thermal insulation as shown in the table below.

In Block 10, the retail stratum has both exposed roof as well as roof lights. Therefore there are requirements for these as well as the external walls in this building.

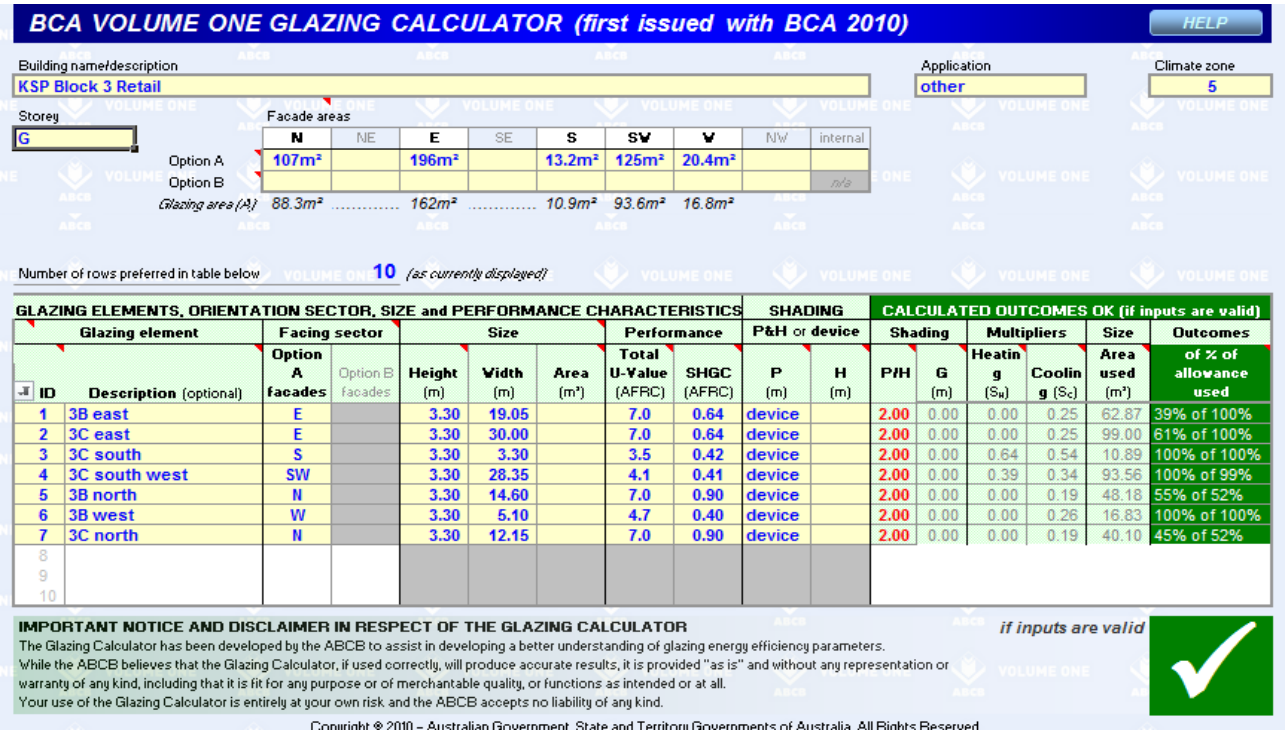
Table 2 below outlines the compliant construction details for the retail areas, which will comply with Section J.

Table 2: Compliant construction details for the retail area

Construction Element	Blocks 3B and 3C	Block 10
External Walls	R2.8	R2.8
Roof	No exposed roof	R3.4
Roof Lights	No roof lights	Max. SHGC 0.34 Max. U-value 3.4
Floors – slab on-ground	No requirement	No requirement
Suspended floor	R1	No suspended floor

7.1.2 Glazing

All glazing in the retail areas will comply with the DTS provisions of Section J. In order to demonstrate compliance, a BCA Glazing Calculator has been utilised. The results are shown in Figures 5 and 6 below.



BCA VOLUME ONE GLAZING CALCULATOR (first issued with BCA 2010) — HELP

Building name/description: KSP Block 3 Retail | Application: other | Climate zone: 5

Storey: G

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	107m²		196m²		13.2m²	125m²	20.4m²		
Option B									n/a
Glazing area (A)	88.3m²		162m²		10.9m²	93.6m²	16.8m²		

Number of rows preferred in table below: 10 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS | SHADING | CALCULATED OUTCOMES OK (if inputs are valid)

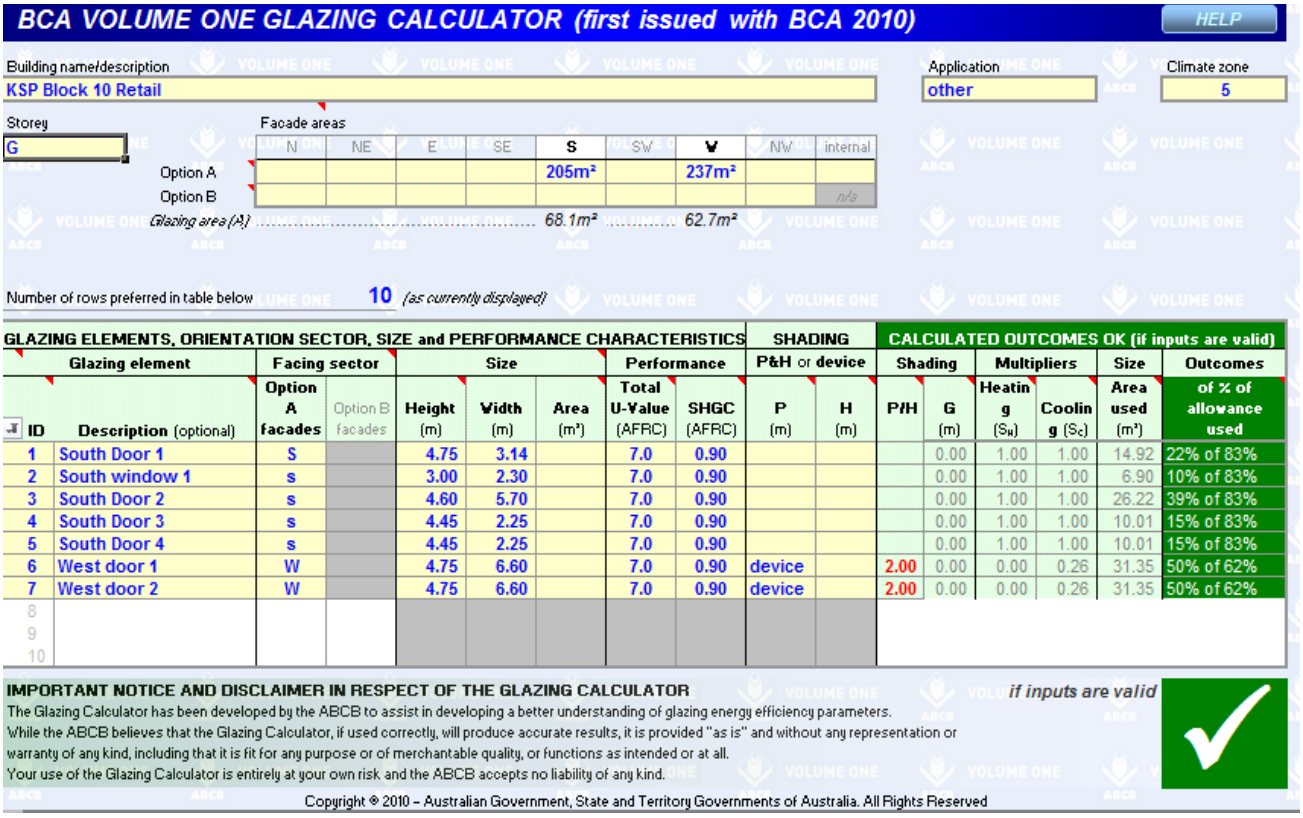
Glazing element		Facing sector		Size			Performance		SHADING P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total U-Value (AFRC)	SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating g (S_W)	Cooling g (S_C)	Area used (m²)	of % of allowance used
1	3B east	E		3.30	19.05		7.0	0.64	device		2.00	0.00	0.00	0.25	62.87	39% of 100%
2	3C east	E		3.30	30.00		7.0	0.64	device		2.00	0.00	0.00	0.25	99.00	61% of 100%
3	3C south	S		3.30	3.30		3.5	0.42	device		2.00	0.00	0.64	0.54	10.89	100% of 100%
4	3C south west	SW		3.30	28.35		4.1	0.41	device		2.00	0.00	0.39	0.34	93.56	100% of 99%
5	3B north	N		3.30	14.60		7.0	0.90	device		2.00	0.00	0.00	0.19	48.18	55% of 52%
6	3B west	W		3.30	5.10		4.7	0.40	device		2.00	0.00	0.00	0.26	16.83	100% of 100%
7	3C north	N		3.30	12.15		7.0	0.90	device		2.00	0.00	0.00	0.19	40.10	45% of 52%
8																
9																
10																

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

if inputs are valid

Figure 6: Glazing calculator for the Class 6 sections of Block 3



BCA VOLUME ONE GLAZING CALCULATOR (first issued with BCA 2010) — HELP

Building name/description: KSP Block 10 Retail | Application: other | Climate zone: 5

Storey: G

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A					205m²		237m²		
Option B									n/a
Glazing area (A)					68.1m²		62.7m²		

Number of rows preferred in table below: 10 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS | SHADING | CALCULATED OUTCOMES OK (if inputs are valid)

Glazing element		Facing sector		Size			Performance		SHADING P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total U-Value (AFRC)	SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating g (S_W)	Cooling g (S_C)	Area used (m²)	of % of allowance used
1	South Door 1	S		4.75	3.14		7.0	0.90				0.00	1.00	1.00	14.92	22% of 83%
2	South window 1	s		3.00	2.30		7.0	0.90				0.00	1.00	1.00	6.90	10% of 83%
3	South Door 2	s		4.60	5.70		7.0	0.90				0.00	1.00	1.00	26.22	39% of 83%
4	South Door 3	s		4.45	2.25		7.0	0.90				0.00	1.00	1.00	10.01	15% of 83%
5	South Door 4	s		4.45	2.25		7.0	0.90				0.00	1.00	1.00	10.01	15% of 83%
6	West door 1	W		4.75	6.60		7.0	0.90	device		2.00	0.00	0.00	0.26	31.35	50% of 62%
7	West door 2	W		4.75	6.60		7.0	0.90	device		2.00	0.00	0.00	0.26	31.35	50% of 62%
8																
9																
10																

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if inputs are valid

Figure 7: Block 10 glazing calculator

The retail stratum of Block 10 contains only south and west facing glazing. Overshadowing from neighbouring buildings means the west facing glazing is capable of restricting at least 80% of summer solar radiation. As a result, the glazing specification is unrestricted.

7.2 Class 3

BASIX replaces Section J requirements in NSW for Class 1 and 2 buildings, and can be applied to Class 3 buildings at the discretion of the planning authority. In this instance, the Department of Planning is the appropriate regulatory authority, and upon advice from the planning consultant, a BASIX assessment has been conducted on the Class 3 (student accommodation) spaces of Blocks 3B, 3C and 10.

7.2.1 BASIX

BASIX is an online tool that is used to rate the energy and water efficiency 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, fittings and appliances.

BASIX consists of three sections – Water, Thermal Comfort and Energy. Each residential development must meet minimum improvement benchmarks in water and energy efficiency to pass BASIX. In addition, the building must be designed in such a way that the heating and cooling demands for the dwellings are below a certain threshold in order to pass the thermal comfort section of BASIX.

The improvement benchmarks are based on the project location, size and number of levels. For Blocks 3B, 3C and 10, the relevant improvement benchmarks are as follows:

- Water – 40% reduction in use when compared to the current state average;
- Thermal Comfort – Heating loads below 50MJ/m^2;
  – Cooling loads below 41MJ/m^2; and
- Energy – 20% reduction in use when compared to the current state average.

7.2.2 Water

Water efficiency for Block3B, 3C and 10 is significantly improved through the connection to the RWTP. Recycled water will be supplied to the blocks for non-potable uses such as sanitary flushing, laundry use and irrigation. In addition, the following water efficient fittings, fixtures and appliances have been specified:

- Toilets – 4 Star WELS;
- Taps – 6 Star WELS;
- Showers – 3 Star WELS, between 7.5L and 9L per minute; and

Through these water efficient strategies, Blocks 3B, 3C and 10 are able to meet the benchmark of water efficiency set by the BASIX tool.

7.2.3 Thermal Comfort

Thermal comfort performance is determined by simulation, which involves the modelling of each dwelling that is to be assessed by an ABSA accredited assessor. This assesses the potential of the dwelling to provide thermal comfort passively, thereby reducing energy requirements for heating and cooling. Annual heating and cooling loads are entered into the BASIX tool to determine if the dwelling passes the maximum allowance for heating and cooling loads.

BERS Pro, produced by Solar Logic, is computational modelling tool used to simulate the thermal performance of dwellings in Australian climates. It has been developed as a residential energy rating tool for the Nationwide

House Energy Rating Scheme ("NatHERS") and has achieved provisional accreditation under the NatHERS Software Accreditation Protocol.

User inputs, such as area uses, orientation, climate zone, building materials and air conditioning provisions, are used to calculate the heating and cooling loads of each dwelling to see if they are within the thresholds set by the BASIX tool.

Modelling was conducted on each of the units in Blocks 3B, 3C and 10. The following modelling inputs were included:

- Unit layout, window sizes and orientation, as shown on the TZG Architectural Layouts listed in *Sources of Information*;
- Carpet floor covering for all habitable spaces, tile floor covering in bathrooms and kitchens;
- External shading device depth of 30cm with locations as shown on the TZG Architectural Layouts listed in *Sources of Information*;
- Overshadowing provided by neighbouring buildings; and
- Materials as shown in Tables 3 and 4.

Table 3: Materials properties included in the thermal comfort model

Building Element	Construction	Insulation	Detail
External walls	Concrete, lined	R2.5	To provide total R2.8
Party walls	Power panel	R1	To provide total R1.8
Internal walls (between dwellings and common areas/corridors)	Power panel	R1	To provide total R1.8
Internal walls (within dwellings)	Cavity panel	None	
Roof	Concrete	R3	To provide total R3.2
Floors	Concrete	None	Carpet to all habitable spaces, tiles to kitchens and bathrooms
Ceilings	Concrete	None	

Table 4: Window, door and roof light properties included in the thermal comfort model

Window Construction Details			Window Pane		Total	
Type	**Glass**	**Frame**	**U-value**	**SHGC**	**U-value**	**SHGC**
Windows and glass doors	Clear float	Aluminium	5.88	0.84	6.57	0.44
Roof lights (glass roof)	Double glazed low-e unit	Aluminium	3.4	0.34	4.85	0.44

The results of the modelling are shown in Tables 5 and 6 below, and demonstrate that the units achieve a "pass" under the thermal comfort section of BASIX.

Table 5: Blocks 3B and 3C thermal comfort modelling results

Block 3B and 3C Unit #	Representative Units	Predicted load ($MJ/m^2.yr$)	
		Heating Load	Cooling Load
1.01		14	26
1.02	1.03, 1.04, 1.05, 1.06, 1.08	4	38
1.07		7	41
1.09		6	24
1.10		27	31
1.11		8	42
1.12	1.13, 1.14, 1.15	4	35
1.16		13	26
1.17		7	30
1.18		4	30
2.01	2.02-2.07, 2.10, 3.01-3.09, 3.12, 4.01-4.09, 4.12, 5.01-5.09, 5.12, 6.01-6.09	0	32
2.08	3.10, 4.10, 5.10, 6.10	1	32
2.09	3.11, 4.11	1	32
2.11	3.13, 4.13	1	23
2.12	3.14, 4.14	10	17
2.13	3.15, 4.15	4	24
2.14	3.16, 4.16	0	36
2.15	3.17, 4.17	0	31
2.6	3.18, 4.18	1	29
2.17	3.19, 4.19, 5.19, 6.11	1	30
2.18	2.19-2.24, 3.20-3.26, 4.20-4.26, 5.20-5.26, 6.12-6.18	4	31
2.25	3.27, 4.27, 5.27, 6.19	3	18
2.26	3.28, 4.28, 5.28, 6.20	0	29
2.27	3.29, 4.29, 5.29, 6.21	1	26
5.11		2	29
5.13		5	11
5.14		20	10
5.15		6	22
5.16		1	18
5.17		1	29
5.18		1	26

Block 3B and 3C Unit #	Representative Units	Predicted load (MJ/m^2.yr)	
		Heating Load	Cooling Load
7.01	7.02-7.09	1	29
7.10		2	28
7.11		2.5	28
7.12	7.13-7.18	5	26
7.19		9	9
7.20		0.1	28
7.21		4	13

Table 6: Block 10 thermal comfort modelling results

Block 10 Unit #	Representative Units	Predicted load (MJ/m^2.yr)	
		Heating Load	Cooling Load
101.01		0.3	27
102.01		49	41
102.02		1	40
102.03		38	36
103.01	104.01	1	30
103.02	104.02	1	38
103.03	104.03	2	18
103.04	104.04	1	27
103.05	105.05	3	21
103.06	102.04, 104.06	0	29
103.07	102.05, 104.07	0	40
105.01		3	20
105.02		2	22
105.03		5	11
105.04		1	29
105.05		6	10
105.06		0	30
105.07		0	37

7.2.4 Energy

Energy consumption in multi-unit residential buildings is heavily influenced by the utilisation and servicing of the common areas. Ventilation, air conditioning and lighting in car parks, lobbies, common hallways and other common spaces needs to be carefully designed to mitigate any impact to BASIX compliance.

Blocks 3B, 3C and 10 do not contain basement car parking facilities, with only a small number of parking spaces being made available to the building within the neighbouring basement car park of Block 5. Only 5 car parking spaces and 54 motorcycle spaces will be provided, which has only a small associated energy consumption relative to a 201 unit development. The lobbies and common hallways are all naturally ventilated and provided with natural daylight. Common areas such as the studies, lounges and common rooms will be provided with controls including occupancy sensors, timer switches and reed switches to reduce unnecessary use of air conditioning and lighting as well as being provided with the option for natural ventilation. This servicing strategy ensures the common areas do not adversely affect the energy performance of the student accommodation.

In addition, energy efficiency has been promoted through the following ESD initiatives:

- The DHW heating demand is being met by the CTP, taking advantage of a lower greenhouse gas emission factor than conventional gas or electric systems;
- Light fixtures will all be dedicated fluorescent or LED fittings;
- Efficient air conditioning systems; and
- Clothes drying lines in outdoor common laundries of 3B. 3C and 10 to reduce dryer energy consumption.

Through these energy efficient strategies, the Kensington Street Precinct meets the 20% benchmark for BASIX energy.

8 Green Star

The Kensington Street Precinct consists of a combination of areas – student accommodation, retail and commercial space types. The space use mix and spatial differentiation of each block is shown in Table 7.

Table 7: Kensington Street Precinct space type breakdown

Building	Class	Space Use Mix
Block 3B – Student Accommodation and Retail	Class 3 and Class 6, respectively	21% Class 6 79% Class 3
Block 3C – Student Accommodation and Retail	Class 3 and Class 6, respectively	21% Class 6 79% Class 3
Block 10 – Student Accommodation and Retail	Class 3 and Class 6, respectively	17% Class 6 83% Class 3

Due to the space use mix and spatial differentiation of the blocks, none of the Kensington Street Precinct buildings meet the eligibility criteria of any pre-existing Green Star tools. Therefore, in order to demonstrate the sustainability aspirations of the project, a 5 star Green Star "principle led" pathway has been established to support the application of ESD initiatives across a full range of environmental categories.

8.1 Eligibility

To be eligible for a Green Star rating under a pre-existing tool, a building must meet certain eligibility criteria. These include:

- Space Use:
  - To be eligible for a Green Star Multi Unit Residential Design v1 rating, at least 80% of the Gross Floor Area (GFA) (excluding internal car parks) must be a combination of Class 2 and/or 1a;
  - To be eligible for a Green Star Office Design v3 rating, 80% of the Net Lettable Area (NLA) must be Class 5; and
  - To be eligible for a Green Star Retail Centre Design v1 rating, 80% of the GFA must be Class 6.
- Spatial Differentiation – The project must be clearly distinct, i.e. functionally autonomous, free standing buildings;
- Conditional requirements – There are mandatory credits that must be achieved under each Green Star tool in order for the project to be certified, e.g. the Ecology Conditional Requirement (Eco-Conditional), which stipulates that the project site must not be located on prime agricultural land, consist of old growth forest, or within 100m of a wetland; and
- Timing of Certification – Certification must be achieved within the timeframe applicable under each Green Star tool, e.g. a Design rating must be achieved within 24 months of practical completion.

The blocks making up this PA do not meet these eligibility criteria. Class 3 buildings (i.e. Blocks 3B, 3C and 10) are not eligible under the Green Star Multi Unit Residential Design v1 tool.

8.2 Green Star Benchmarking

In order to demonstrate the sustainability aspirations of the project, a 5 star Green Star “principle led” pathway has been established to support the application of ESD initiatives across a full range of environmental categories. This “principle led’ approach has been applied, as follows:

- Blocks 3B, 3C and 10 will be designed in accordance with the principles of the Green Star Multi Unit Residential Design v1 tool;

Appendix A demonstrates the 5 star Green Star “principle led’ pathway to be followed for Blocks 3B, 3C and 10.

9 Conclusions

As part of the Central Park Development, Kensington Street Precinct endeavours to achieve a high level of ecologically sustainable development. This report outlines the ESD initiatives that have been promoted in the design of Blocks 3B, 3C and 10.

The ESD initiatives to be implemented for the precinct include:

- Connection to the CTP to supply domestic hot water demands: It is expected that this will provide significant environmental benefit through GHG emissions savings (see above);
- Connection to the RWTP for wastewater treatment and recycled water supply: All wastewater from Blocks 3B, 3C and 10 will be treated through the RWTP. Recycled water will be supplied to the blocks for non-potable uses such as sanitary flushing, laundry use and irrigation;
- Meeting the daylight access and natural ventilation “rules of thumb”, as prescribed by the Residential Flat Design Code:
    - A rule of thumb for daylight access is that 70% of living rooms and private open space should receive a minimum three hours of direct sunlight between 9am and 3pm in mid-winter. In dense urban areas a minimum of two hours may be acceptable. Through daylight analysis and design planning, the common areas of the buildings and the rooftop common space in Block 3 have been located and oriented to maximise the daylight access in accordance with this principle;
    - Another rule of thumb for daylight access is to limit the number of single-aspect apartments with a southerly aspect (SW-SE) to a maximum of 10% of the total units proposed. For Blocks 3B, 3C and 10, when combined there are less than 10% of single-aspect apartments with a southerly aspect; and
    - A rule of thumb for natural ventilation is that 60% of residential units should be naturally cross ventilated. By locating the majority of bedroom clusters on the corners of the buildings, and utilising the atrium in Block 3B as a natural ventilation pathway, it is possible to naturally cross ventilate 78% of the apartments in Blocks 3B, 3C and 10.
- Meeting the Deemed-To-Satisfy (DTS) provisions of Section J of the BCA 2011 for the retail area: All new external walls and roofs will meet the DTS provisions stipulated under Part J1 Building Fabric. All glazing has been specified to meet the DTS provisions stipulated under Part J2 Glazing;
- Demonstrating compliance with Section J of the BCA 2011 following the BASIX assessment route for the student accommodation: All units have been modelled using BERS Pro software to demonstrate compliance with the thermal comfort section of BASIX, i.e. NatHERS. Fittings, fixtures and appliances have been specified, where provided, to maximise water and energy efficiency. Connection to the CTP and RWTP further improves the water and energy efficiency of the building. BASIX certificates have been provided in Appendix B; and
- Demonstrating the project meets the principles of a 5 star Green Star rating: Due to the space use mix and spatial differentiation of the blocks, Blocks 3B, 3C and 10 do not meet the eligibility criteria of any pre-existing Green Star tools. Therefore, in order to demonstrate the sustainability aspirations of the project, a 5 star Green Star “principle led” pathway has been established to support the application of ESD initiatives across a full range of environmental categories.

Appendix A – 5 Star Green Star "Principle Led" Pathway MURT

	Title	Credit No.	Points Available	Points Targeted	Weighted Points	Comment
Management	Green Star Accredited Professional	Man - 1	2	2	0.9	WSP Built Ecology
	Commissioning Clauses	Man - 2	2	2	0.9	Best practice
	Building Tuning	Man - 3	1	1	0.4	Best practice
	Independent Commissioning Agent	Man - 4	1	0	0.0	
	Building Users' Guide	Man - 5	1	1	0.4	Best practice
	Environmental Management	Man - 6	3	3	1.3	Best practice
	Waste Management	Man - 7	2	2	0.9	Best practice
	Metering	Man - 16	6	4	1.8	Smart metering on each floor
Management		Sub-total	18	15	6.7	
Indoor Environment Quality	Daylight	IEQ - 4	2	2	2.0	Shallow floor plate promotes access to daylight
	Thermal Comfort	IEQ -5	2	0	0.0	
	Hazardous Materials	IEQ - 6	1	1	1.0	Achieved
	Internal Noise Levels	IEQ - 7	2	2	2.0	Best practice
	Volatile Organic Compounds	IEQ - 8	4	4	4.0	Best practice
	Formaldehyde Minimisation	IEQ - 9	1	1	1.0	Best practice
	Electric Light Levels	IEQ - 13	1	1	1.0	Best practice
	Private External Space	IEQ - 20	1	0	0.0	
	Dwelling Ventilation	IEQ - 21	3	3	3.0	Trickle ventilators and dedicated kitchen exhaust
	Natural Ventilation	IEQ - 22	3	1	0.0	Naturally ventilated lobbies and common hallways
Indoor Environment Quality		subtotal	20	15	15.0	
Energy	Conditional Requirement	Ene - Con		Yes		
	Greenhouse Gas Emissions	Ene - 1	20	4	3.8	Preliminary prediction
	Unoccupied Areas	Ene - 7	2	2	1.9	Automatic controls for all lighting and power
	Energy Efficient Appliances	Ene - 11	2	0	0.0	
	Peak Electricity Demand Reduction	Ene - 12	2	0	0.0	
Energy		subtotal	26	6	5.8	
Transport	Provision of Car Parking	Tra - 1	2	2	1.7	No parking provided
	Fuel-Efficient Transport	Tra - 2	na			
	Cyclist Facilities	Tra - 3	3	0	0	Requires a CIR for approach applicable to student housing
	Commuting Mass Transport	Tra - 4	5	5	4.2	Proximity to Central Station
	Trip Reduction Mixed Use	Tra - 5	2	2	1.7	Proximity to services
Transport		Sub-total	12	9	7.5	

	Title	Credit No.	Points Available	Points Targeted	Weighted Points	Comment
Water	Occupant Amenity Water	Wat - 1	5	5	7.5	Connection to RWTP
	Landscape Irrigation	Wat - 3	1	1	1.5	Connection to RWTP
	Heat Rejection Water	Wat - 4	2	2	3.0	No cooling towers
	Fire System Water	Wat - 5	1	1	1.5	Design meets requirements
	Water Efficient Appliances	Wat - 7	1	1	1.5	Appliances within 1 star of best rating
	Swimming Pool/Spa Water Efficiency	Wat - 8	na			
Water		Sub-total	10	10	15.0	
Materials	Recycling Waste Storage	Mat - 1	2	2	1.1	Ease of recycling and storage space for recycle bins
	Building Re-use	Mat - 2	0	NA		Achieved
	Recycled Content & Re-used Products & Materials	Mat - 3	1	0	0.0	
	Concrete	Mat - 4	3	3	1.6	Precinct goal
	Steel	Mat - 5	2	2	1.1	Precinct goal
	PVC Minimisation	Mat - 6	2	2	1.1	Precinct goal
	Sustainable Timber	Mat - 7	1	1	0.5	Precinct goal
	Design for Disassembly	Mat - 8	1	0	0.0	
	Dematerialisation	Mat - 9	2	1	0.5	Roof top garden provided with quiet space and tables
	Flooring	Mat - 11	1	1	0.5	Environmentally friendly materials for 50% of flooring
	Joinery	Mat - 12	1	0	0.0	
	Internal Walls	Mat - 14	2	1	0.5	Environmentally friendly materials for 50% of internal walls
	Universal Design	Mat - 15	1	0	0.0	
Materials		Sub-total	19	13	6.8	
Land Use & Ecology	Conditional Requirement	Eco - Con		Yes		Achieved
	Topsoil	Eco - 1	na			Achieved
	Re-use of Land	Eco - 2	1	1	0.7	Achieved
	Reclaimed Contaminated Land	Eco - 3	2	2	1.4	Achieved
	Change of Ecological Value	Eco - 4	4	1	0.7	Achieved
	Outdoor Communal Facilities	Eco - 5	3	1	0.7	Compost bin, dining tables and shaded area on roof top
Land Use & Ecology		Sub-total	10	5	3.5	
Emissions	Refrigerant ODP	Emi - 1	1	1	0.4	Best practice
	Refrigerant GWP	Emi - 2	2	0	0.0	
	Refrigerant Leaks	Emi - 3	na			Not applicable for small systems
	Insulant ODP	Emi - 4	1	1	0.4	Best practice

	Title	Credit No.	Points Available	Points Targeted	Weighted Points	Comment
	Stormwater	Emi - 5	3	3	1.1	Achieved
	Discharge to Sewer	Emi - 6	5	5	1.8	Connection to RWTP
	Light Pollution	Emi - 7	1	1	0.4	Design meets requirement
	Legionella	Emi - 8	1	1	0.4	No cooling towers
Emissions		Sub-total	14	12	4.3	
	SUB-TOTAL CATEGORY WEIGHTING SCORE		129	85	65	
Inn	Innovative Strategies and Technologies	Inn - 1	2	0	0.0	
	Exceeding Green Star Benchmarks	Inn - 2	2	0	0.0	
	Environmental Design Initiatives	Inn - 3	1	0	0.0	
Innovation		Sub-total	5	0	0.0	
	TOTAL CATEGORY WEIGHTING SCORE		129	85	65	

Appendix B – BASIX Certificates

Appendix C – NatHERS Certificates

Appendix D – Stamped Plans

Appendix E – Daylight Access Studies

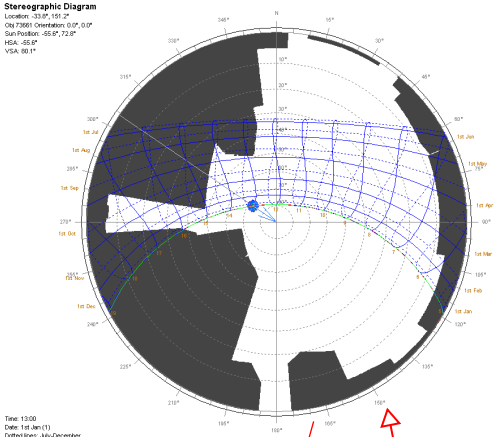
Stereographics Diagram Description

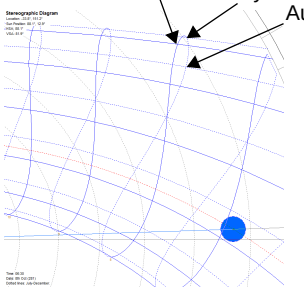
Each horizontal space between the 'figure 8' loops represents 1 hour of daylight incident on the facade during a particular day of the year (dates indicated around the outer edge of the circle).

Levels 4 receive at least 3 hrs of direct sunlight in mid-winter on the eastern facade.

Levels 2 and 3 receive between 2 and 3 hrs of direct sunlight on the eastern facade in mid-winter, aligning with the dense urban location allowance.

The roof top garden achieves over 3 hours of direct sunlight in mid winter.





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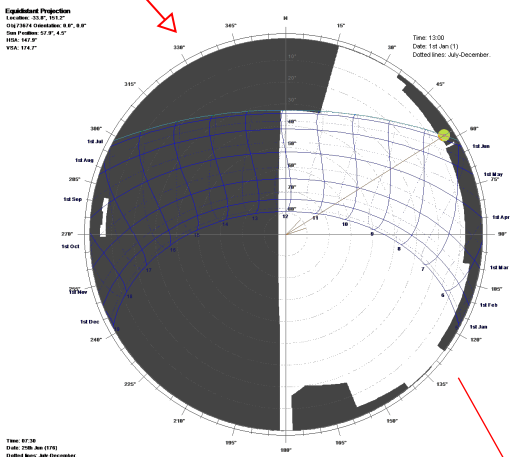
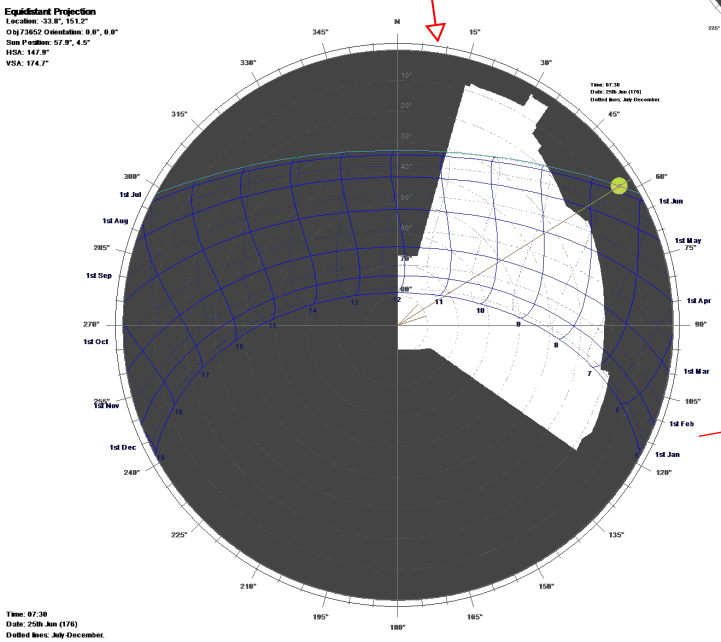
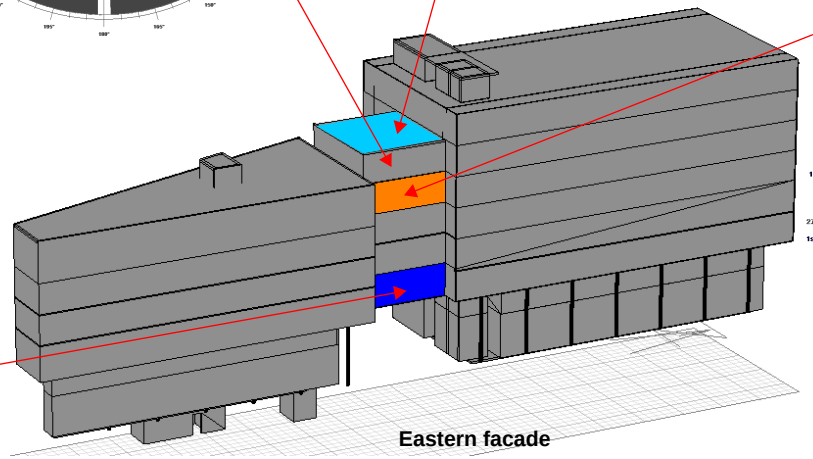
Approx. 3 hrs of daylight



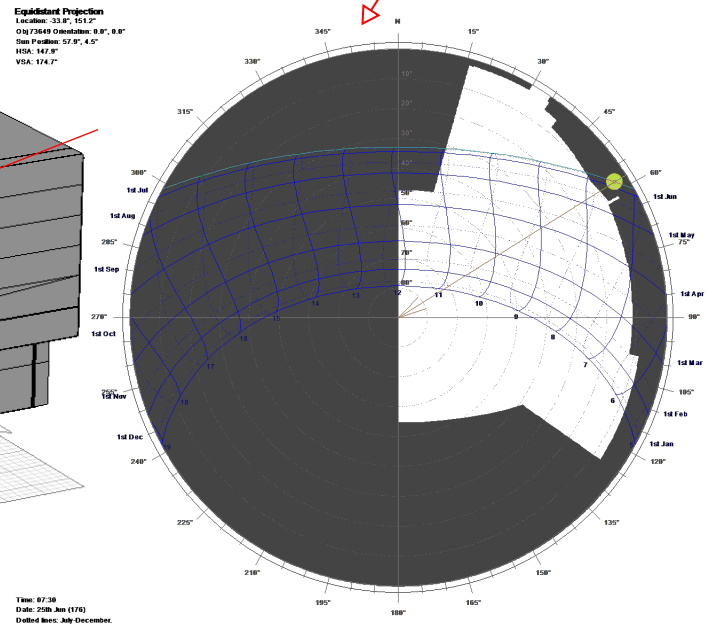
Over 3 hrs of daylight

2 hrs of daylight





Just under 3 hrs of daylight



WSP | Built Ecology

Kensington Street Precinct | Blocks 3B and 3C | Common Area | Daylight Availability Study
Proposed Design

A specialist service of WSP Group

Model: SYD11221000 AXT111012 Kensington Model Complete E
Ref: SYD1122100.0.2 KWF120411 - Proposed 3B and 3C Common Area Daylight Availability Study Rev B

Stereographics Diagram Description

Each horizontal space between the 'figure 8' loops represents 1 hour of daylight incident on the facade during a particular day of the year (dates indicated around the outer edge of the circle).

The current location of the Level 1 Common Area does NOT meet the required criteria of receiving 2 hours (considering the dense urban location) of direct sunlight in mid winter on the northern or eastern facades.

However, the proposed Level 2 Common Area location exceeds the required criteria, receiving 3 - 4 hours of direct sunlight in mid winter on the northern facade.

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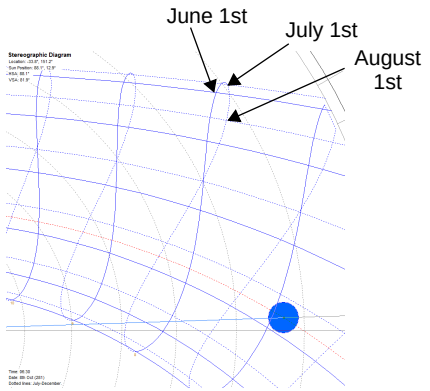
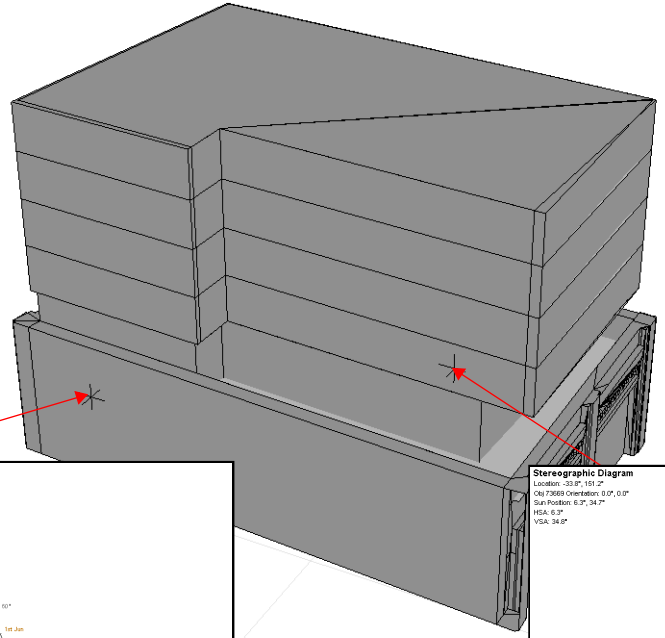
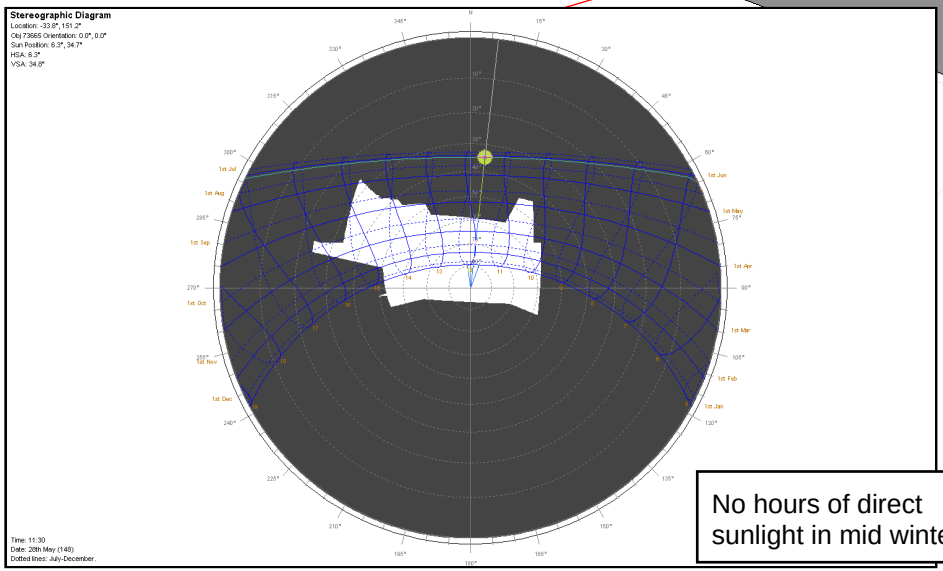


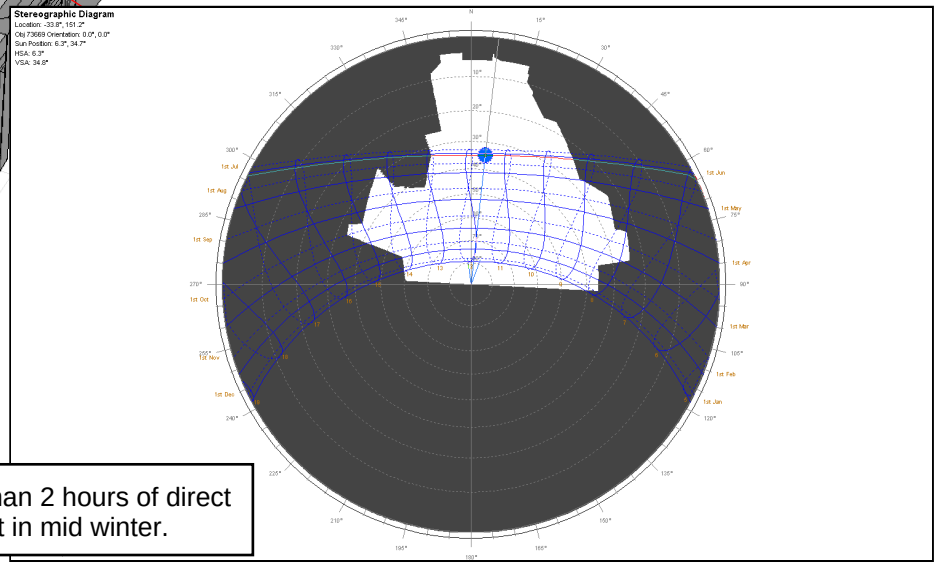


Level 1
Common Area location



No hours of direct sunlight in mid winter.

Level 2
Proposed Common Area location



More than 2 hours of direct sunlight in mid winter.

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