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To	**Frasers Broadway Pty Limited**	Date	**14th December 2012**
Attention	**Anthony Green**	Email	**anthony.green@frasersproperty.com.au**
From	**Katie Fallowfield**	Project No	**SYD1122100**
Project	**Kensington Street Precinct Blocks 3B, 3C and 10**	No. of pages	**6**
Subject	**s75W Modification – ESD Considerations**	Copies	**Alan Davis – WSP Built Ecology** **John Chesterman – TZG** **Rob Beck – WSP**

Dear Anthony,

The building form, services design and layout of Blocks 3B, 3C and 10 have undergone design revisions. These include changes to the façade design, amending the central atrium to multiple voids and a change to the window design for each apartment. The ESD (environmentally sustainable development) objectives for the blocks have been re-affirmed within the design revisions. These are:

1. SEPP 65
2. NatHERS and BASIX
3. Green Star
4. Energy efficiency

A review of the architectural drawings from TZG dated 13th December 2012 has been conducted. Below is a description of the effect of the changes on the above ESD criteria.

SEPP 65

State Environmental Planning Policy (SEPP) 65 makes reference to the Residential Flat Design Code (RFDC) which includes "rules of thumb" for design principles that aim to increase the amenity of residential flat buildings. As Class 3 student accommodation, SEPP 65 and the RFDC technically do not apply to the building design. However, this building endeavours to meet the daylight access and natural cross ventilation ESD objectives to improve the internal amenity for the occupants.

Natural Cross Ventilation

The RFDC states that adequate ventilation should be provided to all apartments. The rule of thumb associated with this principle is:

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

This rule of thumb has been developed to promote the potential of a building's design to comply with the objectives of the Natural Ventilation section of the RFDC. The objectives state:

- *"To ensure apartments are designed to provide all habitable rooms with direct access to fresh air and to assist in promoting thermal comfort for occupants*
- *To provide natural ventilation in non-habitable rooms, where possible.*
- *To reduce energy consumption by minimising the use of mechanical ventilation, particularly air conditioning."*

The design of Blocks 3B and C previously included a large central atrium in Block 3B. The natural cross ventilation strategy took advantage of this atrium by providing fire-rated, acoustically treated openings between the studio apartments and common corridor; allowing fresh air to pass through the external window and studio apartment, into the central atrium, and to be finally exhausted at high level. This strategy facilitated the natural cross ventilation of 78% of the apartments in Blocks 3B, 3C and 10.

The revised design of Block 3B has introduced multiple voids within the common corridor to represent atrium-type functionality. This does not allow for effective natural cross ventilation, as previously described. Therefore, the revised design will take advantage of single sided ventilation for the studio apartments. Natural cross ventilation is still available to the cluster bedroom apartments.

The effectiveness of the single sided ventilation strategy for the studio apartments will be assisted by the bathroom exhaust fan, which will actively extract air from the space whilst operating; this operation will draw make-up (or fresh) air through the external window of the apartment. In addition, when the exhaust fan is not operating, the stack effect created by the bathroom exhaust riser duct extending to roof level will passively draw small quantities of fresh air through the apartment. This is deemed to meet the intent of the RFDC for Natural Ventilation in the following ways:

Objective 1: To ensure apartments are designed to provide all habitable rooms with direct access to fresh air and to assist in promoting thermal comfort for occupants.

A thermal model was created to demonstrate the provision of adequate fresh air to all habitable rooms and to assist in promoting thermal comfort for the occupants. This model included internal heat gains from the occupant, kitchen and appliances, and was based on the inclusion of the bathroom exhaust and a trickle ventilator in the façade to maintain an adequate fresh air supply.

The thermal model was analysed to determine the level of carbon dioxide in the space as a benchmark for the provision of adequate fresh air. ASHRAE Standard 62.1-2007 states that the carbon dioxide levels should not exceed 700ppm in an occupied space.

The results of the model demonstrated that the CO_2 levels in the space will only exceed the 700ppm benchmark if the window is closed. This would be expected in any occupied space regardless of the number of windows or their location. With the window completely open, the CO_2 levels remain below 700ppm. Figures 1 and 2 demonstrate the CO_2 levels in the space on a typical day in summer, with the space occupied 24 hours, and the window opening according to the indoor temperature.

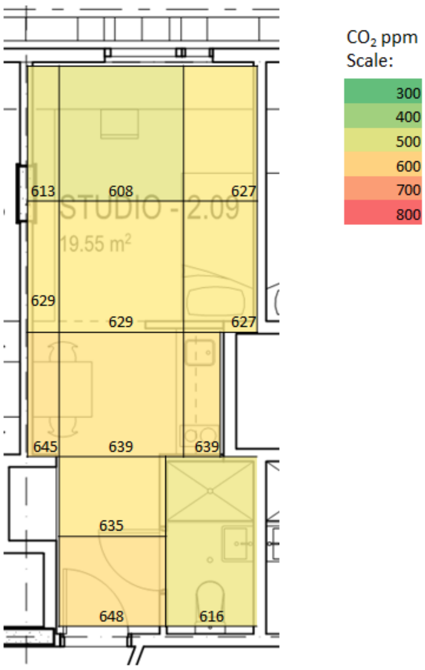

Figure 1: Peak CO_2 levels on a typical day

Figure 1 demonstrates fresh air is effectively circulated throughout the apartment and that the peak CO_2 levels do not exceed 700ppm while the window is open.

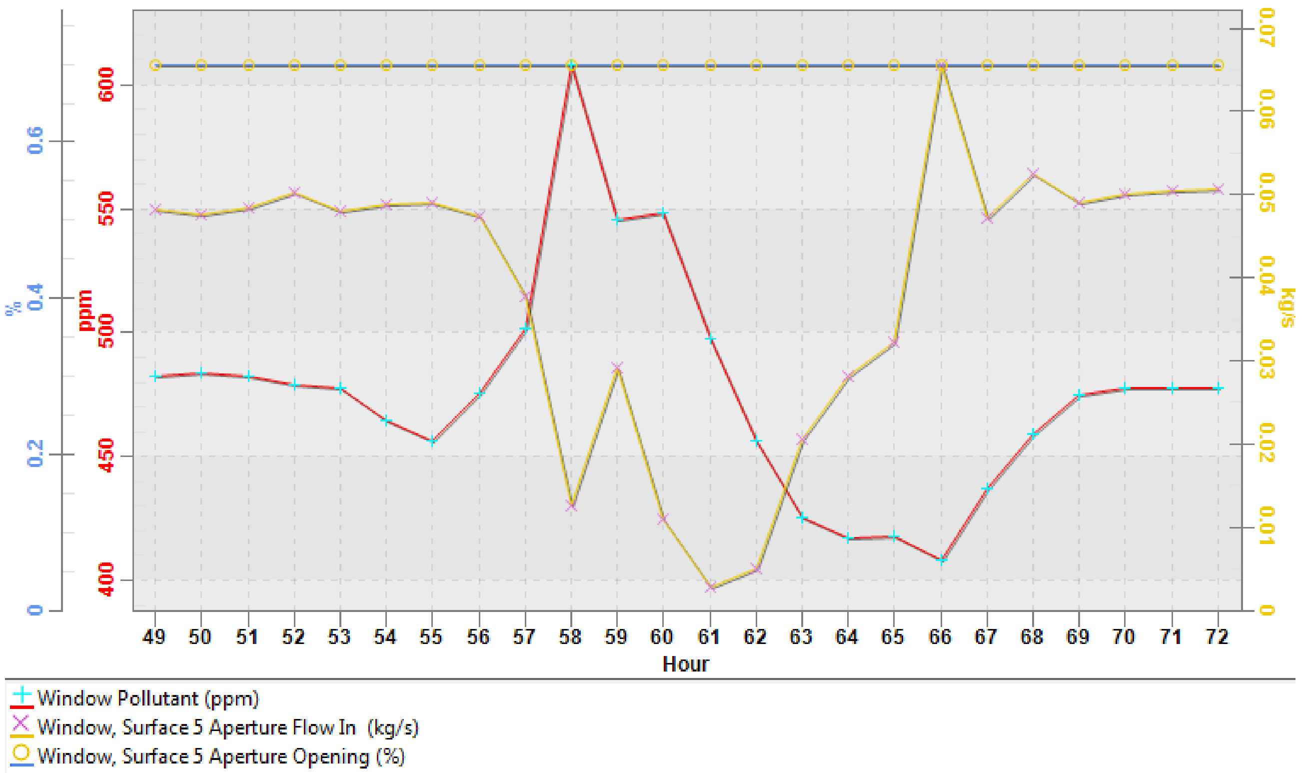

Figure 2: CO_2 levels and air flow through the space on a typical summer day.

Figure 2 demonstrates that the fresh air flow (Window, Surface 5 Aperture Flow In) through the window varies during the day even when the window is maintained fully open. This varying fresh air flow is affected by wind speed, wind direction and temperature differential between the indoor and outdoor environment. The pollutant level (CO_2 level) increases as the fresh air flow decreases, as expected.

In order to demonstrate the single aspect ventilation strategy improves the thermal comfort performance to the habitable rooms, the thermal model was analysed to demonstrate the internal temperatures experienced in the space compared to the ambient conditions.

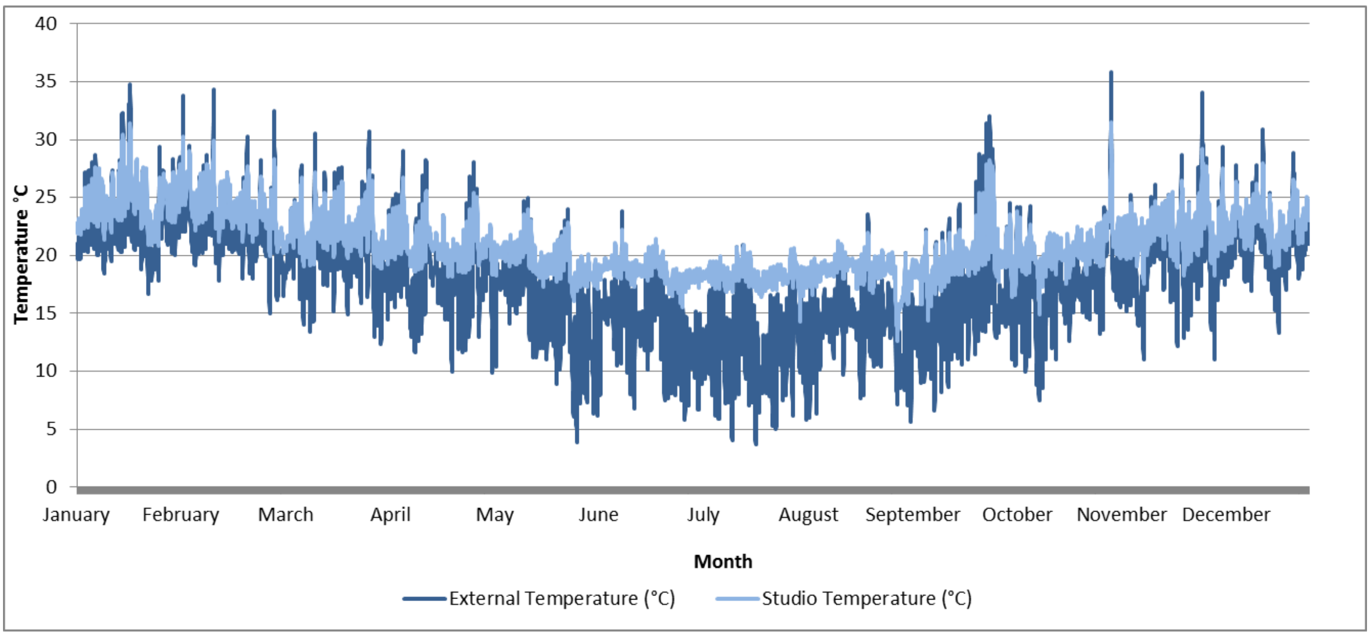

Figure 3: Internal temperatures and ambient conditions for a typical year

Figure 3 shows that the internal temperature is maintained between 18-30°C for the majority of the year. It should be noted that this temperature is based on the form of the building, external shading from shading devices and external buildings, building envelope performance and internal heat gains.

Due to fire safety design constraints, the cluster apartments cannot take advantage of natural cross ventilation as the bedroom doors will need to be fire-rated and automatically closing. However it is expected that the cluster apartments will perform similarly to the studio apartments. Single sided ventilation will adequately ventilate the bedrooms which are similar in design to the studio apartments, with a shallower depth, therefore the air circulation in these rooms will be same or better than the deeper studios. The common living/kitchen areas are even shallower in plan than the bedrooms, with multiple windows provided, therefore the living/kitchen rooms will be adequately ventilated with single sided ventilation.

Objective 1 Conclusion: A single sided ventilation strategy is capable of providing adequate fresh air to the studio apartments and facilitates improved thermal comfort for the occupants.

Objective 2: To provide natural ventilation to non-habitable rooms, if possible.

Kitchens and bathrooms are generally considered to be non-habitable rooms. In a typical studio apartment, the kitchen is contained within one habitable space; therefore the single sided ventilation strategy also serves the kitchen. The bathroom is within a separate room in the studio; however make-up (or fresh) air for the bathroom exhaust is sourced through the external window and studio apartment.

Figure 1 above shows that the external window configuration in a typical studio is capable of providing sufficient fresh air to the space such that all areas of the studio (incl. kitchen) and its en-suite are adequately ventilated.

Objective 2 Conclusion: Single sided ventilation is capable of providing natural ventilation to the non-habitable rooms.

Objective 3: To reduce energy consumption by minimising the use of mechanical ventilation, particularly air-conditioning.

The apartments will be provided with air conditioning, but not ducted fresh air. To reduce energy consumption for air conditioning, the apartments have been designed to utilise passive design measures (as outlined for Objectives 1 and 2) to maintain thermal comfort. This includes a responsive building envelope design, the application of external shading devices and the provision of natural ventilation.

As shown in Figure 3 above, temperatures in the space are typically maintained between 18-30°C for the majority of the year. This reduces the demand on air-conditioning to provide appropriate conditions in the space.

Objective 3 Conclusion: Single sided ventilation facilitates the thermal comfort performance of the studio apartments and minimises the need for air-conditioning.

Daylight Access

The RFDC stipulates the following “rules of thumb” for the provision of adequate daylight access in residential buildings:

- *“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.*
- *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 were approved as part of the previous design 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 receive at least three hours of direct sunlight on the eastern elevation between 9am and 3pm in mid-winter
2. The common area of Block 10 is located in the north west corner of Level 2. A daylight availability study found that this common area receives four hours of direct sunlight on the northern elevation between 9am and 3pm in mid-winter
3. Only 4% of the single-aspect apartments have a southerly aspect

The revised design sets back the common areas in the link by 1500mm from the building line, as opposed to the previously approved 2000mm set back. Therefore daylight access to these spaces will be improved.

The common space in Block 10 has been changed in the new plans however it maintains its northern façade therefore daylight access is not reduced.

The number of south facing apartments has been increased to 8% of the total apartments provided across 3B, 3C and 10; however; this is still below the 10% threshold recommended by the RFDC.

NatHERS and BASIX

BASIX certificates were provided with the previous Project Application for Blocks 3B, 3C and 10. These certificates demonstrated the blocks met the BASIX benchmarks for thermal comfort, and water and energy efficiency.

The Department of Planning and Infrastructure (DPI) has since provided a clarification that NatHERS software does not apply to Class 3 buildings and the BASIX software is not tailored to assess this type of building design.

The DPI has provided further clarification that if the regulatory authority requests rating documentation then the BASIX and NatHERS software tools can be used for guidance or advice only.

Therefore, the BASIX certificates for Blocks 3B, 3C and 10 have not been re-issued. The following sets out performance guidelines for the blocks based on the previous BASIX certificates:

- The revised design of Blocks 3B, 3C and 10 does not impact on the water and energy sections of the BASIX certificates as the inputs to these sections will not be changed, i.e. the commitments made under the previous design must be adhered to in terms of the specification of fittings and fixtures
- The NatHERS performance scores for the studio apartments will differ due to the slight increase in size and an increase in the number of studio apartments in Block 10. However, the previous results can be considered indicative of the performance of the revised design

Green Star

The approved Concept Plan for Central Park (as amended) provides the following condition of consent for buildings in the Central Park:

> "*Future Project Applications for multi-unit residential, commercial and retail development (including adaptable re-use of heritage buildings) shall achieve a **minimum 'Design' and 'As-Built' 5** Star Green Star rating **utilising the 'Multi Unit Residential', 'Office' or 'Retail' tools**.*
>
> ***"Where buildings are not eligible for an official Green Star rating, using the above standard tools, buildings shall be designed in accordance with the principles of a 5 Star Green Star building. Evidence of the project's ineligibility and its consistency with Green Star principles shall be provided with future relevant Project Applications."***

The GBCA (Green Building Council of Australia) has provided a formalised eligibility response confirming that the blocks do not meet the eligibility criteria of any of the three pre-existing Green Star tools identified.

Therefore, to demonstrate the blocks conform to the high environmental standards associated with a 5 Star Green Star rating, the design of the blocks will prescribe to a 5 star Green Star "principle led" pathway in accordance the Green Star Multi Unit Residential v1 tool, i.e. the design and construction of the blocks will been equivalent to a 5 star Green Star rating.

A proposed "principle led" pathway has been provided with the previous PA submission. This pathway demonstrates that the proposed design achieves 65 weighted points in principle, which is the equivalent of a 5 star Green Star rating.

Energy Efficiency

The mechanical system proposed for conditioning the student accommodation units has changed from electric wall mounted units located in the room to VRV units connected to air cooled condensers on the roof. These units will be more energy efficient due to the higher COPs which can be achieved in this type of system.

Conclusion

The revised design of the student accommodation in the Kensington Street Precinct maintains the ESD objectives for the project and therefore does not require amendments/alterations to the existing conditions.

Regards,

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