

Rhodes Development - Stages 2A and 3A 40 Walker Street, Rhodes

ESD and BASIX Summary Report

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Prepared on behalf of Billbergia Pty Ltd

by

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Introduction

This report was prepared by Ecospecifier Consulting on behalf of Billbergia Pty Ltd. The report focuses on the ESD initiatives (i.e. “Ecologically Sustainable Development” initiatives) of the proposed development at 40 Walker Street, Rhodes (Stage 2A and 3A).

BASIX and ESD guidelines have been used to provide specific benchmarks, however Billbergia, in collaboration with the architects, consultants and Ecospecifier Consulting, also strive to develop building principles that consistently exceed these minimum benchmarks.

In particular, Billbergia strive to give future residents the very best in terms of passive heating and passive cooling. This, when combined with other energy-efficient strategies (listed later in the report) will lead to low energy demands for the residents and low greenhouse gas emissions for the proposed development. Billbergia focus on passive performance as a first priority and have incorporated smart design principles and technologies (such as argon-filled double glazing, generous insulation, sensible shading and well-placed thermal mass).

Passive heating, passive cooling, natural ventilation and natural lighting have been used wherever possible throughout the whole development. These essential design principles will not only last the life of the building but are low-cost, low maintenance and reliable, especially when compared to other, often prohibitively complex and expensive “bolt-on technologies”. Furthermore, these passive design principles will provide owners with a low-energy, cost-effective and healthy lifestyle.

Indeed, for Rhodes Stages 2A and 3A, Billbergia have sought to use sustainability & ecological principles that are cost-effective for the residents, both now and in the long-term future. Water & electricity pricing will continue to increase and Billbergia are constantly looking at how they can make these services more affordable and reliable for residents and tenants. The building design & ongoing running costs must be considered and integrated at every design stage. For example, common area lighting, ventilation, recycled water and lift services should last the design life of the building and offer long term efficiencies & protection from strata levy escalation. Billbergia’s approach uses a holistic building design to combine sustainable dwellings with efficient common areas (through passive design, smart technologies and intelligent building management systems).

In summary, the building designs presented will offer sustainable lifestyles and affordability to the residents as well as high levels of thermal comfort, energy efficiency and water efficiency. It also contains sound and proven sustainable & ecological principles integrated seamlessly into the building design, in part through smart technologies and in part through excellent passive efficiencies.

Thermal Comfort

In regards to thermal comfort, the design team worked collaboratively to develop a design with excellent passive heating, passive cooling and natural ventilation. The success of these initiatives is proven by the outstanding thermal comfort results, which are provided below. Part of the success of the design has also been brought about by the developer's willingness to adopt new ideas & construction materials.

BERS Pro v4.1 was used to simulate the thermal comfort conditions for all the apartments. Overall, the apartments performed extremely well with an average star rating of 7.1 stars. They also achieved an average heating load of 21.8 MJ/m².year and an average cooling heating load of 13.3 MJ/m².year. Both of these values are well below the average targets permitted under BASIX (which are 51.0 MJ/m².year and 45.0 MJ/m².year, for heating and cooling respectively).

To highlight this achievement even more, the GBCA awards 2 points in the Green Star Multi-Unit Residential Tool (under IEQ-5) if any development achieves average heating and cooling loads both under 30 MJ/m².year. The results achieved are well under these "high-performance" values and are a testament to the excellent passive heating, passive cooling and natural ventilation of the design.

Some of the thermally efficient materials and passive design techniques incorporated to achieve the results include:

- Double-glazed, tinted, Low-E, argon-filled glazing for all windows (to reduce heat loss in winter and heat gain in summer)
- External wall insulation (R2.5 added for all walls, including those adjacent to car parks)
- Roof insulation (R3.0 or more added insulation)
- Hebel, concrete walls and concrete slabs used to provide internal thermal mass
- Generous balconies used to provide horizontal solar shading
- Louvres and sun hoods used to provide additional horizontal solar shading
- Generous window openings in bedrooms and living areas to provide natural ventilation and passive cooling
- Dual aspect and/or corner aspect for many apartments to assist with cross-ventilation
- Winter gardens to provide additional thermal buffering in winter
- Compact design and small external surface areas for most units (to reduce unwanted heat loss and heat gain through the building envelope)

It should be noted that these passive design techniques are long-term and should generally last the life of the building. Other, more ephemeral strategies such as curtains have not been included. Furthermore, Billbergia (along with Ecospecifier) have also recognised the benefits of high-performance glazing, when compared to many shading devices. All energy simulation tools (AccuRate, BERS Pro, etc) will assume that sliding and folding louver screens are used "correctly" for 100% of the year. This means that the models will assume that every resident will open all adjustable devices in the winter and then shut them all in the summer.

In reality, this will not be the case. Many residents may prefer to adjust their screens less frequently and will rely more on artificial heating and cooling. This means that the simulation programs assume that sliding louvered screens do not reduce solar gain in winter, despite the unwanted shading they may produce for many apartments. High tech windows, however, will always perform to their best, regardless of the season and regardless of the residents' actions.

Importantly, the excellent thermal comfort results mentioned above have been achieved with often “problematic” apartment orientations (such as south-east or south-west). Inevitably, these orientations will always provide difficulties for large-scale, high-rise apartment designs. However, good design principles and technologies (such as those as listed above) have helped to alleviate these difficulties. In particular, the high-tech double glazing has ensured low heating and cooling loads for all units. Indeed, thermal comfort testing recently undertaken by Ecospecifier has indicated that the double glazing proposed will lead to as much as a 70% reduction in the annual heating and cooling of the dwellings (when compared to standard single glazing).

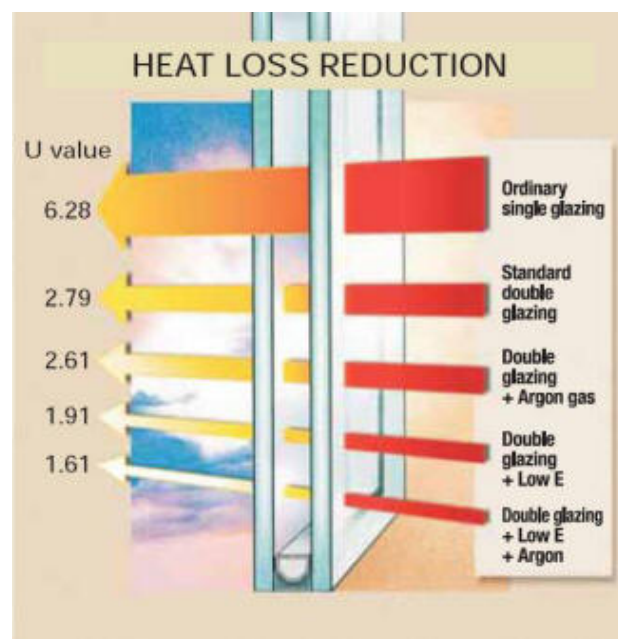
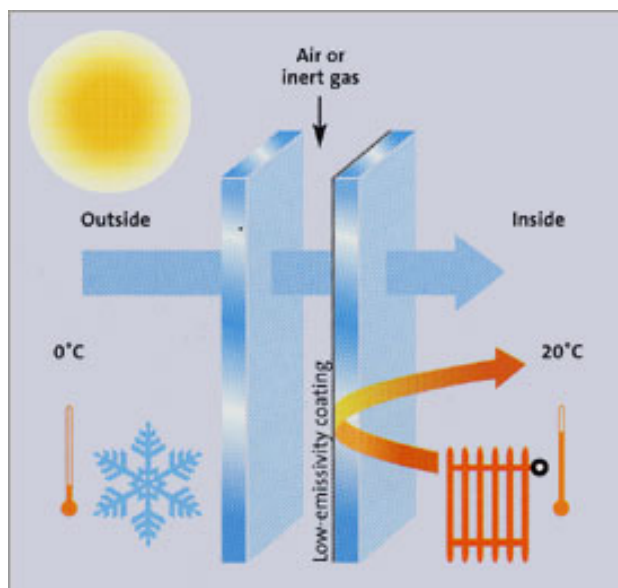
Windows

As discussed, the double glazing window components are tinted, low-E and argon filled. The specific IGU units were selected to allow for generous spacing between the glass components. This not only improves the efficiency of the IGU unit but, as an added benefit, also reduces the amount of background noise penetrating the residential dwellings. Billbergia has been using double glazing on all their residential projects for over 5 years.

The high performance glazing has also been designed with the careful selection of tints and colours, to control heat loads, to allow deep light penetration and also to minimize light reflection both when viewed internally and externally.

The typical aluminium framing selected also has the ability to allow for varying wind loads by utilising detailed computer modeling. This enables the suppliers to individually size components, reducing unnecessary waste of valuable aluminium whilst ensuring the building components maintain a uniform sectional sizing.

The clear benefits of these high-tech windows have been tested for this and other projects. The double glazing proposed will lead to as much as 70% reductions in the annual heating and cooling of the dwellings (when compared to standard single glazing).



Water and Energy – BASIX Initiatives

As shown by the five BASIX certificates, the proposed development at 40 Walker Street, Rhodes (Stages 2A and 3A) has performed very well in regards to thermal comfort, water and energy. The water and energy efficient strategies are listed in the certificates and have also been summarised below. Importantly, the water scores have NOT included the dual reticulation system (since it relies on a future water supply) so in actuality the future water performance will far exceed 40/40 (and should really be closer to 55/40, based on previous similar projects). As seen in the certificates, all five buildings have also comfortably exceeded the Energy target of 20 (scoring between 22 and 25).

Water Efficient Strategies:

- 5 star taps
- 4 star toilets
- 3 star showers (mid-range, i.e. between 6 and 7.5 L/min)
- 3.5 star dishwashers
- Large rainwater tank collecting from roofs for all irrigation water and car-wash water
- High percentage of indigenous and/or low-water plant species
- Recycling of the sprinkler test water for all sprinkler systems
- Dual reticulation for all residential toilets and laundries (designed for the future treated wastewater supply to this area, hence no extra marks are given in BASIX)

Energy Efficient Strategies:

For the common areas:

- PV cells to generate solar power (around 100m²)
- Solar pool heating (gas-boosted)
- Pool pump with timer
- Gas heated sauna
- Central gas-fired storage hot water systems (with insulated ringmains and supply risers)
- Compact fluorescents in hallways and lobbies (with timers and motion sensors)
- Fluorescent or compact fluorescent lights in other common areas (with motion sensors, time-clocks and/or manual switches)
- Fluorescent lights in car park areas with motion sensors and time clocks (and just 20% permanently lit “safety lighting”)
- VVVF lifts with gearless traction
- BMS (building management system)
- PFC (power factor correction)
- Car park has over 90% natural air supply, as well as carbon monoxide sensors and variable speed fans
- Hallways and lobbies areas have some natural ventilation and natural light

For the apartments:

- Compact fluorescents and/or LEDs for the main light fittings in the dwellings (undedicated)
- Efficient reverse cycle AC – 1.5* for both heating and cooling (new rating system)
- Zoned air-conditioning controls to ensure that only the required bedrooms and/or living areas are being conditioned, at any given time
- Gas cooktops and electric ovens
- Dishwashers 4* energy and 3.5* water
- Dryers 2*
- Individual ducted exhaust and individual fans (switched on/off) to ventilate bathrooms and laundries (as opposed to continuous and usually inefficient central systems)

Conclusion

This report has summarised the excellent ESD credentials of this development. In particular, it has highlighted the exceptional thermal comfort, water and energy performance of the dwellings. Indeed, the apartments achieved an impressive 7.1 star average which will be among the highest averages for any major residential developments in Australia.

Furthermore, the apartments achieved an average heating load of just 21.8 MJ/m².year and an average cooling load of just 13.3 MJ/m².year. Both of these average loads are well below the average values permitted under BASIX (which are 51.0 MJ/m².year and 45.0 MJ/m².year, for heating and cooling respectively).

These impressive results are a testament to the huge emphasis that has been placed on the passive thermal performance of the buildings. Furthermore, the results have been achieved despite the unavoidable and problematic site restraints placed on large multi-residential developments, especially in relation to the inevitable south, south-east or south-west facing dwellings. Billbergia intended, from the very start of the design process, to focus attention on passive thermal performance as a first priority and therefore used sensible design principles, materials and technologies (such as the argon-filled, low-E double glazing) to achieve the excellent star ratings.

Indeed, passive heating, passive cooling, natural ventilation and natural lighting have all been used extensively throughout the development. These essential design principles will not only last the life of the building but are low-cost, low maintenance and highly reliable, especially when compared to other, complex and expensive “bolt-on technologies”. Furthermore, these passive design principles will provide owners with a low-energy, cost-effective and healthy lifestyle.

Importantly, the BASIX water scores have not been able to include the dual reticulation system (since it is a future water supply) so in actuality the future water performance will far exceed 40/40 (and should really be closer to 55/40). This can be somewhat of a flaw in BASIX since developers will typically not provide for short-term rainwater or treated wastewater reuse in apartments, when they know that a future reticulated treated wastewater supply will be provided to the development. In regards to Energy, all five buildings have also comfortably exceeded the Energy target of 20 (scoring between 22 and 25).

In summary, the building design offers affordability to the residents as well as high levels of thermal comfort, energy efficiency and water efficiency. It also contains proven, cost-effective and sound sustainable & ecological principles integrated seamlessly into the building design. Together these strategies should place the development firmly within the realms of “industry best practice”.