ENERGY CONCEPTS GROUP

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ABSA Association of Building Sustainability Assessors Member # 21154

4237 – 61 Brookes Street
SUSTAINABLE DESIGN INITIATIVES
SHORT FORM REPORT
06 May 2015, Revision C

Acknowledging the updates in the Wolter Consulting Group letter dated 11 September 2019 (Ref:19-0414E) and subject to endorsement of the landscaping design to the podium car parking levels under condition 20 of this approval

AMENDED IN RED
By: Sarah Hampstead
Date: 21/11/2019
Queensland Government

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2015/682
Date: 22 November 2019
Queensland Government

1.0 Sustainable design values

1.1 Aim

The aim of this report is to provide a short non-technical review of some of the environmentally sustainable design initiatives that are currently proposed within the development.

1.2 Development

The development will comprise 130 apartments in a striking 17-storey tower at 61 Brookes Street in the inner Brisbane suburb of Bowen Hills, located just two (2) kilometres from Brisbane's Central Business District (CBD). All up, 61 Brookes Street.

The ground floor comprises an entry foyer, retail/commercial activities fronting Brookes Street, and car parking accessed from Exhibition Street. The podium comprises several levels of car parking with apartments starting on level 5. This means all apartments have some views. There are ten apartments per floor on levels 5-16, with those on level 5 having expansive courtyards. An exclusive residents-only rooftop recreation deck with swimming pool is situated on level 17. All apartments come with one car parking space and all two-bedroom apartments have two bathrooms. There are two lifts, meaning waiting times will be minimal.

The apartments proposed for 61 Brookes Street are well-sized; at an average of 65m² gross for one-bedroom apartments and 95m² gross for the two-bedroom apartments. The average balcony size is 10m² for the onebedroom apartments and 13m² for the two-bedroom apartments. Apartment sizing is important, as the ability for tenants to share comfortably makes a property more attractive, and is a way to appeal to a wider audience of prospective renters and/or future buyers. As apartment sizes in many new inner-city projects shrink to the extent that long-term residency is compromised, focus is shifting to those projects that offer greater "liveability"

The development is detailed on the following Cottee Parker Architects, 61 Brookes Street, architectural drawings:

- Site Plan SD 1003 Revision 00
- Ground Floor SD 2010 Revision 00
- Level 1 SD 2011 Revision 00
- Level 2 SD 2012 Revision 00
- Level 3 SD 2013 Revision 00
- Level 4 SD 2014 Revision 00
- Level 5 SD 2015 Revision 00
- Levels 6&7 SD 2016 Revision 00
- Levels 8,10,12,14 &16 SD 2017 Revision 00
- Levels 9, 11, 13, 15 & 17 SD 2018 Revision 00
- Level 18 SD 2018 Revision 00
- Roof SD 2019 Revision 00
- Level 5 SD 2015 Revision 00

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1.3 Limitation

This report is limited to providing a short form non-technical review of some of the environmentally sustainable design initiatives that are currently proposed within the development. It does not provide the technical details of how these initiatives are achieved.

1.4 Conclusion

As detailed within this report, the development will incorporate the following innovative ESD superior design outcomes that are beyond the current best practice solutions adopted in the Brisbane multi-level residential market:

- Energy consumption will be reduced by the built form of each apartment having an average NatHERS rating of at least 8 stars.
- Significant increase in the green space and landscape amenity per apartment.
- Energy consumption data available to the users and occupants on a www interface to facilitate user empowerment resulting in lower energy consumption and reduced operating costs.

2.0 Sustainable design Values

The development aims to achieve an appropriate balance of sustainable principles and cost-effectiveness by adopting the following sustainable design values:

- Provide a framework for the design, construction and operation of the development to achieve appropriate sustainable outcomes.
- Ensure the natural ecosystem is not adversely affected by the construction or operation of the development.
- Use appropriate building materials to reduce the impact of construction and operation of the development.
- Create healthy indoor environment for the developments users and occupants.
- Encourage the users and occupants of the development to capitalise on green transport options.
- Ensure the development contributes to a safe and diverse community by integrating the CPTED strategies and by providing adaptable spaces.

3.0 Design

3.1 Design Approach

The overall rectangular site is situated on two street frontages, by Brookes Street to the east and Exhibition Street to the west, with an existing heritage building on the adjoining site to the north, and a high-rise 20 storey residential development (“Belise Apartments”) under construction on adjacent south site. The site is currently a one-storey office development built in the mid-2000s, with undercroft car parking. The site’s alignment along Brookes Street necessitates a response which reaffirms this alignment and defines the street and public place.

The proposed site measures roughly 47m x 30m with a land area of approximately 1,450sq.m. Prominent views exist towards the site from the inbound and outbound approaches along St Pauls Terrace. Extensive views outward from the site from the New Farm bend of the Brisbane River to the Gateway Bridge exist with distant views of Moreton Bay and the Central Business District being achieved from upper levels of any future development on this site.

The site is falls approximately 3 metres towards its south western corner to 12.520 AHD. The subject site is unencumbered by a flood overlay.

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The development is well situated within walking distance of the Brisbane Showgrounds and in direct line of sight along St Pauls Terrace and Brookes Street. The site has pedestrian access to significant amounts of public amenity within the local area including:

- Chinatown, the Royal Brisbane Hospital, train stations, and retail districts within a 15 minute walk.
- The RNA Showground's currently undergoing a significant urban renewal are accessible via a 5 minute walk.

3.2 Pedestrian Amenity

The design contributes to the Precinct by activating and contributing to the streetscape. The proposed ground level ties into the 15.300m AHD street level and integrates its entries and retail spaces at this level. The pedestrian journey will be enhanced on Brookes Street, where the proposed building line has been setback 3m from the boundary, giving this space to the public realm. Where possible, walls on side boundaries have been treated to reduce the appearance of sheer faces. The project greatly increases the landscape experience through green walls, vertical gardens, and 3-storey high landscaped sculptural trellises along the street front.

The design offers a fine-grain urban retail experience with opportunities for different businesses to add life to the street. The design maximises the potential for activation along the street and minimises services to the street frontage. The project brings landscaped spaces to the ground plans in entry treatments with mini gardens to the entry lobby.

A high continuous street awning over the entire Brookes Street boundary allows shelter from weather, allows natural light, as well as being a nod to the existing scale and massing of the adjacent properties. This 4.0m wide awning is proposed to be set back 2.7m from the kerb to allow for street trees and utility poles. At the rear Exhibition Street frontage is where the majority of services and car entry will be located, however the design proposes the building line to be set back 1.0m from the boundary, also offering additional pedestrian amenity to this frontage.

3.3 Community Benefit And Engagement

The site planning offers a number of benefits for the community, such as:
1. Innovative podium treatment including three storey vertical gardens.
2. Dynamic architectural language to active frontages.
3. High quality materials and interior detailing.
4. A high ratio of landscape amenity spaces provided per unit, compared to other projects in Brisbane:
    - 63 Skyring Terrace, Newstead: 1.2m per unit
    - 237 Barry Parade, Fortitude Valley: 1.1m per unit
    - 25-29 Fortescue Street, Spring Hill: 1.2m per unit
    - 61 Brookes Street, Bowen Hills: 3.2m per unit
5. Entry gardens to street level.
6. A high average NatHERS rating of 8 stars (higher than "business-as-usual" developments.)
7. A high number of bike spaces proposed: 1 per unit + 28 visitors.
8. Yoga area to improve residents' health and wellbeing.
9. Lobby meeting space for informal gathering.
10. Raingardens to store and improve water quality.
11. Bring biodiversity to the precinct through planting and careful selection of plant species and reduce carbon footprint.
12. High quality seating to streetscape to promote active uses.
13. Booster cupboard public art wall to promote local artists.
14. Letterbox art to promote local artists.
15. Separate recycling bin chute to provide geniune recycling opportunity for residents.

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3.4 Materials

The overall design aesthetic adopts a multi-faceted approach, with a greater use of glass, portraying a softer, lighter and transparent built form to Brookes Street, while adopting a more durable material palette for the north and western facades with the use of sun shading elements; in combination with overlapping awnings, fins and expressed edges on the facades. The use of glass will reflect its surroundings, creating a dynamic façade, while the expressed edges create a dialogue with its surroundings by contrasting the harder more solid angular language of the neighbouring buildings. It is intended to introduce externally concealed landscape planters at podium parking levels of the building. This will help soften the sheerness of the podium levels and, coupled with a soft landscape strategy at the ground floors, deliver a greener outcome in a street that is heavily hardscaped.

3.5 Public Realm

The Public realm is defined by the hard and soft landscaping of the Brookes Street frontage, which will convey the idea of an open and lively space. This frontage aims to create a softer threshold condition to Brookes Street and will improve its appearance and amenity with an articulated entry point which incorporates bench seating, green walls, a deep planting zone, extensive glazing to retail areas, artwork screening, as well as a building line set back 3.0m off the property boundary which facilitates pedestrian and cycle amenity and safety, and gives back space to the public realm.

Overhead, the frontage will be sheltered by a 4.5m high street awning that slopes up gradually to plateau at 7.0m. The awning width is a continuous 4.0m and is set back 2.7m from the kerb. This allows for the increased perception of an active front at the Brookes Street, a visual connection to the adjacent heritage building, allows natural light to penetrate the ground floor at certain times of the day, provides weather and sun protection, reduces the perceived scale of the podium, and adds to the urban environment to promote a comfortable human scale space to Brookes Street.

3.6 Built Form

The typical residence floors have been arranged to address the east and west orientation of the site and take into account the potential future development of adjacent sites. The façade is generally uniform for the typical floor levels, although the massing is broken down through the use and arrangement of different glazing types, long horizontal awnings, and slab edge detailing to assists with the perception of built form and scale.

The design proposes a 3000mm floor to floor height as standard to all units, which reduces the amount of potential storeys, but presents a more generous living space for its residents. There are three levels of podium car parking, owing to the probability of encountering difficulties in excavation of a basement level. It is intended to treat the three levels of podium car park with an undulating screen and landscape planters which tie in with the 4.5m high frontage aesthetic.

Figure 3.6

4.0 Natural ecosystem

4.1 Ecological Impact

The development site is ideal for the proposed style of development as the site has limited ecological value to the natural ecosystem due to:

- It being located in a built up urban area.
- It does not have significant agricultural value.
- It is not near ecologically sensitive habitat.
- The site does not contain endangered or threatened species.

Location Plan : 61 Brookes St, Fortitude Valley(not to scale) [Imagery (c)2015 Google, Sinclair Knight Merz & Fugro]

Figure 4.1

4.2 Environmental Impact

The development site is ideal for the proposed style of development as the sites existing conditions facilitate the construction of a mixed use development with a lower environmental impact that a similar development constructed on a greenfield site.

By developing a multilevel facility, the development will be able to obtain the greatest environmental benefit and minimise the negative impact. This is achieved by optimising the design solutions and providing common facilities and amenities to be shared between users.

4.3 Refrigerant ODP

To reduce the potential long-term damage to the Earth's stratospheric ozone layer through the accidental release of refrigerants to the atmosphere the development will utilise refrigerants that have minimal ozone depletion potential.

4.4 Insulant ODP

To reduce the potential long-term damage to the Earth's stratospheric ozone layer through the release of ozone depleting substances to the atmosphere the development will utilise thermal insulation that does not use ozone depleting substances in either its manufacture or composition.

4.5 Landscape / Green Amenity

The development will include a high ratio (almost three time the average) of landscaped and green amenity spaces per unit, compared to other projects in Brisbane:

- 63 Skyring Terrace, Newstead: 1.2m per unit
- 237 Barry Parade, Fortitude Valley: 1.1m per unit
- 25-29 Fortescue Street, Spring Hill: 1.2m per unit
- 61 Brookes Street, Bowen Hills: 3.2m per unit

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Concept

The development will embrace the surrounding urbanised environment, adding a contextural layer to 61 Brookes St. Subtropical plantings and hardstand materials will introduce the new building at street level and provide residents with a pleasant environment to live and recreate. The landscape will present as a sculptural mass, unifying the styles of building facades and architectural elements to form an integrated design response. The design reconnects the built environment with nature through specific strategies and attempts to incorporate the environmental forces of the site. Specific interventions include rain gardens, food production gardens - micro herb farming, and a naturally ventilated parking and facade structure. The building will be sustainable in terms of its carbon footprint, but goes further by incorporating the fabric of the building and its landcape to create not just an energy efficient building but also happy and efficient residents.

Ground Floor

The ground floor will showcase a resilient, subtropical collection of materials and planting species that will assist in softening, screening and greening the site. Green walls and trellis planting will dress the vertical face of the buildings entry facades, enveloping the street frontage and defining a green foyer and entry sequence. Pockets of staggered planting along the main entry wall will create unique opportunities for architectural expression; defining the character and design intent of the building collectively. The design allures the public from Brookes St with visual and physical connections, defining public accessibility into the space. It is intended cascading and creeping foliage will soften the building, assisting in greening the site and promoting a health landmark development.

1. Street trees and pavement treatments to BCC standards
2 Modular planter forming seating with statement tree to define building entry
3 Green wall and stepped planters with planting wrapping up walls and column to Level 01 and facade beyond:
4 Building signage wall integrated into planting elements
5 Wire trellis above entry to create green ceiling
6 Green wall
7 Sculptural facade with vertical green curtain; plant growth from planters on carpark levels 02-04
8 Commercial tenancy
9 Green roof over with overflow planting

Figure 4.5.1
Ground floor green amenity

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Building Facade

The building façade will create a sculptural form and green curtain that wraps the southern and northern faces of the building from the ground level to the Level 05 podium. The facade will be extended in part at the 5th level with plantings to the residential terraces. Permanent planters from the ground level to level 04 carpark will allow for the healthy and vigorous growth of appropriate plant species. The facade will passively add to the functioning's of the building and increase the general health and well being of its residents through employing the theory of Biophilic Architecture. The ESD principle of Biophilia states benefits of natural daylight, ventilation and green foliage is proven to reduce sick days, ameliorate urban heat island effect and reduce the buildings carbon footprint.

Figure 4.5.2
Carpark level green curtain

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Podium Level

The podium level private terraces will be a robust and complimentary collection of materials and planting species that will provide adequate flexible use spaces, and assist in softening, screening and greening the building edges. Small shade trees and screen planting will be appropriately located to maintain views out, but screen views in The edge of each terrace will have a 900mm high, 1200mm wide planter to ensure healthy growth of plants. Artificial turf and paved hardstand areas will make up the remaining terrace areas.

Figure 4.5.3
Podium level green amenity

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Roof Level

The roof level private terraces residential common spaces will be multi functional and adaptable, promoting different uses and activities, The layered approach to materials and planting; foliage, texture, colour and form will provide depth, height, shade and soft screening to create intimate spaces to increase use, promote ownership and maximise social interaction.. The space will facilitate active and passive recreational uses with a pool terrace, BBQ areas, yoga lawn, communal herb gardens, private and shared seating alcoves and lounges all combining to ensure that the terrace is functional and relatable. The multi level terracing and change in materials strengthens the division of large spaces to create private areas for both group or private interactions. The northern orientation and open air nature of the terrace will provide a pleasant microclimate that will encourage year round use and enjoyment.

Figure 4.5.4
Roof level green amenity

5.0 Appropriate use of land

The impact of the development on the natural ecosystem is minimised as the site has already been fully developed thus eliminating the need for further land clearing.

Location Plan : 61 Brookes St, Fortitude Valley(not to scale) (Imagery (c)2015 Google, Sinclair Knight Merz & Fugro)

Figure 5.0

The site is ideally suited to a residential development as it is located with convenient pedestrian access to public transport, the Royal Brisbane Hospital and associated facilities.

6.0 Integrated water management

6.1 Occupant Amenity Potable Water Efficiency

The development will be provided with the following features to reduce the demand of the potable water consumption of building occupants.

- Leak detection facility.
- High efficiency fixtures and fittings.
- Minimal delay in the availability of hot water.

The development will be provided with a leak detection device fitted to the incoming town water service to ensure that leaks in the reticulation system do not go undetected.

Water efficiency will be achieved by the use of 4 star WELS rated fixtures and tap ware.

- Toilets will be dual flush 4.5 litre / 3 litre.
- Shower roses will be 9 litres per minute.
- Sink taps will be 6 litres per minute.
- Basin taps will be 6 litres per minute.

The expected average delay for hot water delivery to each outlet will be less than 5 seconds which will reduce the water that is wasted by waiting for the hot water to arrive when compared to a typical multi use building central hot water system.

6.2 Water Meters

Metering of the water used by each tenant within the development will be provided to highlight differences in water use and allow the water consumption to be actively managed.

Details of how to read and interpret the meters will be included in the building manager's guide.

The building managers will be able to access details of the water usage including the following information:

- The total amount used during that period.
- The average daily amount used during that period.
- The total amount used over the previous three periods.
- The total amount used over the same period during the previous year.

6.3 Sewer

The use of 4 star WELS rated fixtures and tap ware will have a significant impact in reducing the volume of sewerage discharging from the site.

6.4 Hot Water

The development will incorporate a central gas fired hot water system with the consumption metering for each apartment connected to the www interface / display.

7.0 Energy use

7.1 Electrical Metering

The development will purchase electricity as a single bulk supply allowing the operator to capitalise on bulk purchase savings and increase the likely hood of the development using certified green power.

The building users guide will include a focus on the operator purchasing certified green electricity to further reduce the greenhouse gas impact of the development.

Electrical consumption is the biggest contributor of greenhouse gas emissions arising from buildings (approximately 89% according to the Australian Greenhouse Office). To successfully manage energy consumption it is important that sufficient data is available to building managers to allow them to monitor consumption and compare historically. As such Sub-metering will be provided to allow the building users and occupants to fine-tune the operation and to minimise consumption.

Details of how to read and interpret the meters will be included in the building users guide.

The electricity consumption metering for each apartment will be connected to the www interface / display to allow the users / occupants the ability to access details of the electricity usage detailing the following information:

- The total amount of energy used during that period.
- The average daily amount of energy used during that period.
- The total amount of energy used over the previous three periods.
- The total amount of energy used over the same period during the previous year.
- The total amount of greenhouse gas emissions generated during that period.
- The average daily amount of greenhouse gas emissions generated during that period.
- The total amount of greenhouse gas emissions generated over the previous three periods.
- The total amount of greenhouse gas emissions generated over the same period during the previous year.

This facility will provide the users and occupants with the ability to monitor their energy usage and will enable them (through the use of innovative technology) to best use their appliance / lighting etc to curve their usage which will provide environmental and financial benefits.

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7.2 Lighting Efficiency

To reduce the environmental impact of the building, the average lighting will be provided with efficiency better than 5.0 W/m². To ensure the lighting is not over-designed consuming excess raw materials and excess energy the lighting will be designed to meet the minimum appropriate requirements without excess spill or over lighting.

A traditional 80m^2 unit with 20% fluorescent iron core lighting and 80% incandescent lighting will have an efficiency of 15.2w/m^2.

4 x 24w = 96w
12 x 60w = 720w
4 x 100w = 400w

Total 1,216w

1,216w / 80m^2 = 15.2w/m m^2

This is approximately 26,400Kwh over 15 years

The project will utilise 100% LED and electronic ballasted fluorescent lighting or better in the residences with an efficiency of 4.4w/m^2.

10 x 20w = 200w
10 x 15w = 150w

Total 350w

350w / 80m^2 = 4.4w/m m^2

This is approximately 7,700Kwh over 15 years for each apartment. With a difference of 18,700Kwh per apartment over 15 years the total energy saving across the 170 apartments will be in the order of 3,179,000Kwh over the 15 years.

All common area lighting will have an average efficiency better than 5 w/m m^2.

7.3 Lighting Control

To provide greater flexibility for light switching, making it easier to light only occupied areas and thus reduce the environmental impact, the building lighting it will be provided as follows:

- All non-public individual or enclosed spaces have individual switches;
- Switching function that is clear and easily accessible by building occupants and managers.
- The apartments will be provided with a room access control system that disables the apartment lighting when the room is not occupied.

7.4 Air-conditioning

The air conditioning systems will be individual reverse cycle, split ducted systems for each apartment.

Each apartment has the ability to control their own environment and not require a central system to be constantly running such as chilled water pumps, cooling towers, centralised chillers or pumping condenser water throughout the building. This will result in a reduced energy consumption and less impact on the environment for the building when using individual system versus a centralised system.

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As each apartment will have access to their energy consumption data, this will encourage owners to only use their air conditioning when really required as it impacts directly on energy consumption / environmental impact and their living costs.

Each air conditioning plant will be using inverter technology to ensure the compressor only uses sufficient power (speed controlled) to match the load to any given time again ensuring minimal power usage.

When heating is required, the reverse cycle option is one of the most efficient methods of providing heat and will be available individually as required in each apartment.

As the proposed air-conditioning system is air cooled, potential legionella concerns associated with water cooled systems will be avoided.

7.5 Carpark Ventilation

All carparking will be naturally ventilated to comply with relevant Codes to avoid the use of mechanical ventilation. Traditionally, basement level carparking or enclosed podium level car parking requires mechanical vantilation to ensure a safe and compliant environment within these areas.

The removal of the requirement for these systems results in a reduction of a significant amount of power useage from the project and assists in reducing the impact on the environment in a number of ways:

- Removes the requirement to find and treat locations for the exhaust points and thereby avoiding possible noise and air pollution issues that require treatment.
- Reduces energy consumed and therefore assists in reducing the carbon footprint of the development.

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7.5 Thermal Performance

To allow the building occupants to capitalise on the Brisbane climate and reduce the need to use air-conditioning the class 2 apartments will all achieve an average weighted NatHERS energy rating equal to or better than 8 stars in accordance with the NCC BCA 2014 NatHERS protocols.

The high level thermal performance has been achieved by the development incorporating

- A high performance low E glazing system.
- The buildings orientation maximising the northern aspect, while treating west-facing units with deep balconies and operable screening.
- Deep balconies, sun-shading and overhangs providing protection from solar heat gain.
- High performance insulation in all external walls and ceiling spaces below an external roof.
- Ceiling fans in all living spaces and all bedrooms.
- Operable windows.
- Appropriate levels of glazing and shading to capitalise on the different winter and summer solar loads.

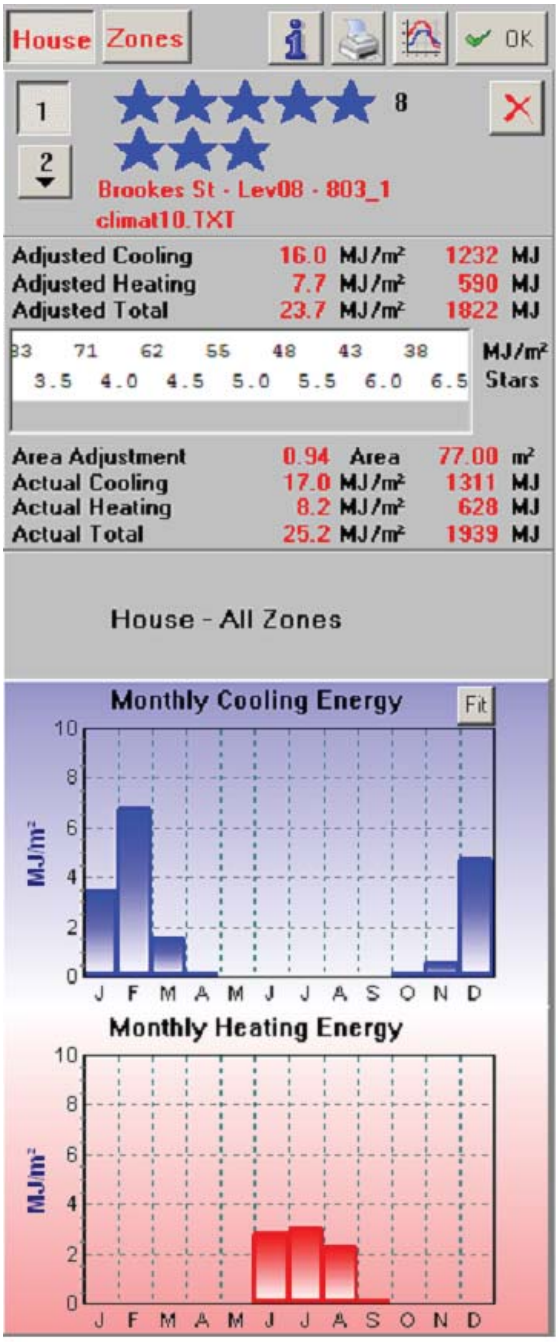

Figure 5.8.1
NatHERS Output Results for unit 8.03

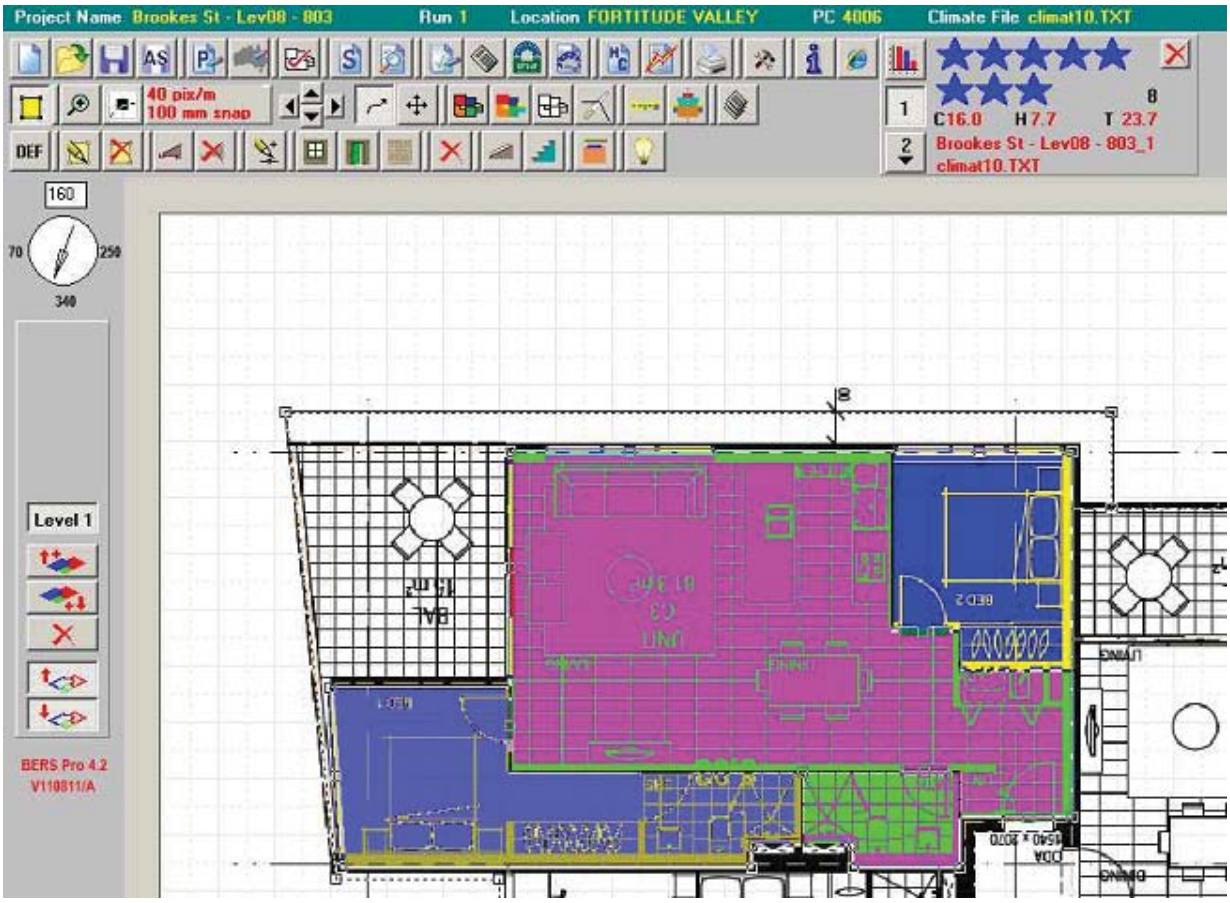

Figure 7.5.2
NatHERS model for unit 8.03 which achieves the average 8 star rating.

7.6 Air-conditioning Control

To minimise the impact of the air-conditioning on the energy consumption the following control features will be provided:

- Individual manual control of the air-conditioning in each apartment.
- Individual toilet exhaust to each apartment to minimise the amount of air-conditioned air lost through the toilet exhaust system. .
- The controls are clear and easily accessible by building occupants.

7.7 Energy Efficient Appliances

All of the following appliances supplied as part of the base building will have the following minimum MEPS rating:

- Air-conditioning cooling 5 Star.
- Air-conditioning heating 4 Star.
- Clothes dryer 2 Star.
- Washing machine 4 Star.
- Dish washer 3 Star.
- Refrigerator / freezer 4 Star.

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7.8 Hot Water

The development will incorporate a central gas fired hot water system with the consumption metering for each apartment connected to the www interface / display.

7.9 Carbon Reduction

To reduce the amount of carbon dioxide that is discharged into the atmosphere by the operation of the development the following measures will be adopted:

- Energy efficient lighting.
- Energy efficient appliances.
- Occupancy control of apartments lighting and air-conditioning.
- Ceiling fans in all bedrooms and living spaces.
- Individual toilets exhaust system per apartment.
- Natural ventilation for all car parking.

The building users guide will include a focus on the operator purchasing certified green electricity to further reduce the greenhouse gas impact of the development.

8.0 Waste

8.1 Facility Management

To increase the amount of waste that is being recycled, the development will be provided with a general waste garbage shoot and a second garbage shoot for recycled materials. The building users guide will include information on the use of the garbage shoots and the rubbish that can be recycled.

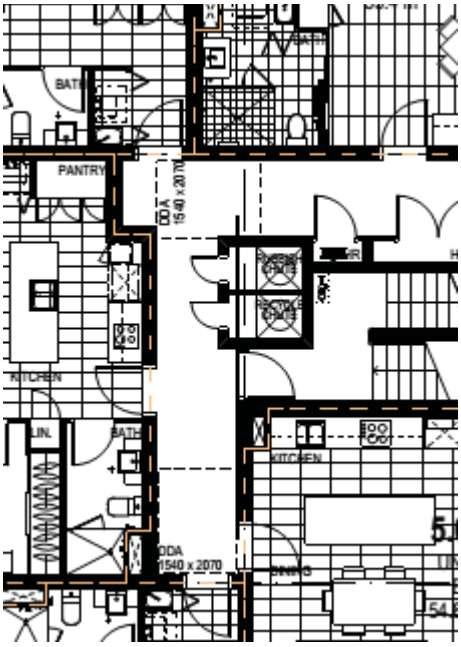

Figure 8.1.1
Accommodation level twin garbage shoots

All users and occupants will have access to the general waste and recycled waster garbage shoot on each accommodation level.

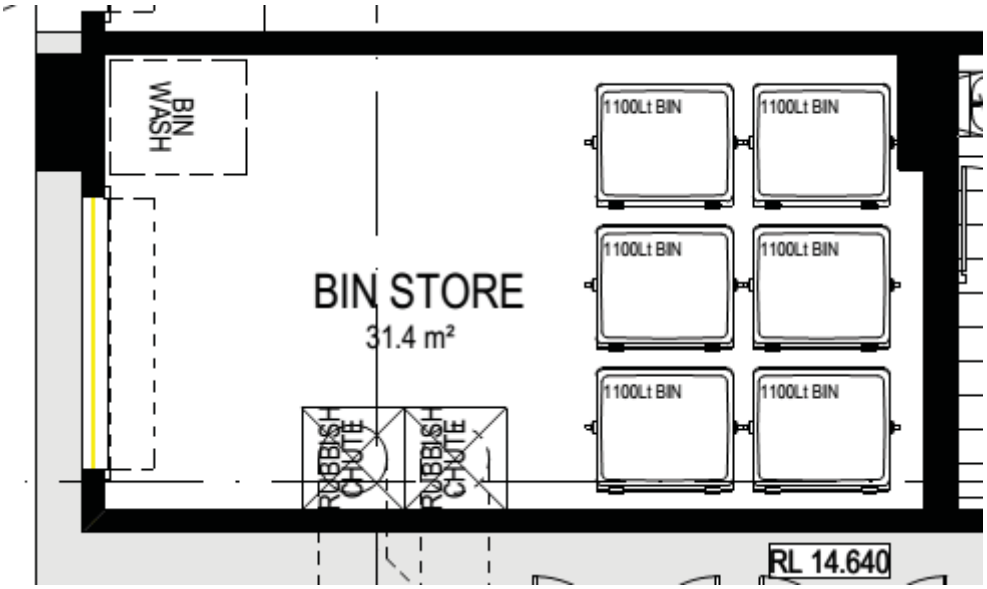

Figure 8.1.2
Bin storage area facilitating recycling

A dedicated bin storage area will be provided for the occupants for the separation, collection and recycling of consumables with good access for all occupants for collection by recycling companies. The storage area will be adequately sized to allow for recycling of, paper, glass, plastics and metals.

9.0 Cost efficiency

9.1 Consumption

Where practical the design will aim to minimise the ongoing operational consumption costs for the life of the development such as energy, water and waste removal.

9.2 Maintenance

Where practical the design will aim to minimise the ongoing maintenance costs for the life of the development such as servicing costs, chemical requirements, replacement costs.

9.3 Design and Material Selection

The initial capital cost, product performance, product life, durability, embodied environmental impact and the operational cost will be considered when making design and material selections.

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10.0 Indoor environment

10.1 Design

It is anticipated the occupants may close the windows more than normal to avoid the road noise and to a lesser degree dust and pollution from the nearby major roads. Accordingly the quality of the indoor environment is been considered more important than in a traditional multi-level residential development. Within the indoor environment the development will provide enhanced occupant satisfaction and reduce the exposure to irritants and contaminates by:

- Eliminating lighting flicker.
- Appropriate noise levels.
- Natural ventilation options.
- Ceiling fans.
- Locally controlled mechanical ventilation.
- Low VOC paints, carpets, adhesives and sealants
- Appropriate artificial lighting levels and opportunity to capitalise on natural lighting.
- Appropriate local control of the airconditioning.

10.1 High Frequency Ballasts

To prevent eyestrain and headaches associated with the flicker of conventional fluorescent lights that operate at a frequency of 50Hz, high frequency electronic ballasts that operate at over 32,0000Hz (32 kHz) will be provided for all fluorescent lighting. At this frequency the flicker is totally undetectable either consciously or unconsciously.

10.2 Internal Noise Levels

As internal noise is a significant factor in terms of occupant satisfaction and wellbeing the building will be provided to meet the recommended design sound levels provided in Table 1 of AS/NZS 2107:2000.

10.3 Ventilation

All living spaces and bedrooms will be provided with operable windows to allow the occupants to capitalise on natural ventilation when appropriate.

All of the living spaces and bedrooms will be provided with ceiling fans.

Each apartment will be provided with a dedicated mechanical ventilation system to exhaust the wet areas and the laundry which will:

- Provide the occupants with individual control allowing the ventilation system to be operated only as required providing an increased level of occupant satisfaction.
- By only operating the ventilation system as required the noise experienced in a conventional multi-level residential development with a central exhaust system will be avoided.
- By only operating the ventilation system as required the energy consumed by a central exhaust system in a conventional multi-level residential development will be significantly reduced.
- In addition to saving the fan operation energy, by only operating the ventilation system as required the energy consumed by the air-conditioning systems continuously cooling the replacement air exhausted by a central exhaust system in a conventional multi-level residential development will be significantly reduced.

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10.4 Volatile Organic Compounds

To address the health effects of exposure to VOC associated with 'sick building syndrome' such as – eye, nose and skin irritation, headache, lethargy the level of VOC's used in the building construction will be restricted to the following levels:

Paints

VOCs are to be in accordance with The Australian Environmental Labelling Association, Inc. Standard No: AELA 23-2005 ' Australian Voluntary Environmental Labelling Standard Architectural and Protective Coatings'. Conformance with VOC levels listed in this standard (refer to table below) shall be demonstrated by providing test reports from laboratories accredited to carry out the relevant tests and/or calculations and appropriate documentation of production methods and quality controls.

Product Type	Maximum VOC content (g/Litre)
Latex primer for galvanised iron and zincalume	60
Exterior latex undercoat	55
Interior latex undercoat	65
Interior sealer	65
Exterior timber primer	50
Interior gloss	75
Interior semi-gloss	16
Interior low sheen	16
Interior flat-washable	16
Interior flat-ceilings	14
Exterior gloss	75
Exterior semi-gloss	70
Exterior flat and low sheen	50

VOC limits on architectural coatings covered. Allowable levels include water content in the formulation.

For solvent based coatings the paint shall not contain VOCs in excess of 200g/litre. For recycled paints the VOC level (averaged across batches) in the paint must not exceed 100g/litre.

The VOC content of the paint shall either be calculated from the VOC data for each of the raw materials or, experimentally by ATSM D3960, as qualified The Australian Environmental Labelling Association, Inc. Standard No: AELA 23-2005 'Australian Voluntary Environmental Labelling Standard Architectural and Protective Coatings'.

Where the raw material is a mixture of compounds, some of which contain VOCs, the VOC content of the mixture may in turn be calculated from the VOC content of the individual components. Where this is not known, it must be determined by the methodology detailed in AELA 23-2005.

Carpets

Reference: Carpet and Rug Institute Green Label (U.S)

- Total VOC limit 0.5 mg/m² per hour
- 4-PC (4-Phenylcyclohexene) 0.05mg/m² per hour

Compliance Testing: Carpet and Rug Institute Green Label (U.S) OR American Society for Testing and Materials (ASTM) D 5116 'Guide for Small-scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products'.

Adhesives and Sealants

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Reference: South Coast Air Quality Management District (California, U.S.) – Rule 1168

• Indoor carpet adhesive	50 grams of VOC per litre
• Carpet pad adhesive	50
• Outdoor carpet adhesive	150
• Wood flooring adhesive	100
• Rubber flooring adhesive	60
• Sub-floor adhesive	50
• Ceramic tile adhesive	65
• Cove bas adhesive	50
• Dry Wall and Panel adhesive	50
• Multipurpose construction adhesive	70
• Structural glazing adhesive	100
• Architectural sealants	250

The VOC limits are less water and less exempt compounds.

Compliance Testing: Refer South Coast Air Quality Management District Rule 1168 for testing methods and exempt compounds.

10.5 Lighting Levels

Adequate lighting for specific tasks and activities within the apartments will be provided with attention given to providing solutions that are not over-designed. Switching will be provided to allow the occupants to capitalise on natural lighting when available.

All of the living spaces and bedrooms will be provided with direct natural lighting by windows and balcony doors enhancing the occupant comfort level in addition to providing the opportunity to reduce reliance on the artificial lighting.

11.0 Green transport

11.1 Amenities

As detailed on the following map, the development provides pedestrian and bicycle access to a significant number of amenities and public facilities including:

- 500 metres from RNA Showgrounds;
- 650 metres from Fortitude Valley railway station;
- 850 metres from Bowen Hills railway station;
- 700 metres from Emporium and Homemaker City;
- 750 metres from James Street;
- 1.1km from Chinatown;
- 1.2km from the Royal Brisbane and Women's Hospital;
- 1.2km from the Gasworks precinct (Newstead); and
- 2.0km from Brisbane's CBD.

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Figure 11.1
Local Amenities

1. 61 Brookes Street
2. RNA Showgrounds
3. Royal International Convention centre
4. Bowen Hills Railway Station
5. Royal Brisbane & Women's hospital
6. Access to Airport Link Tunnel, Clem-7 Tunnel and Inner City Bypass.
7. Homemaker centre
8. Emporium
9. HQ Commercial Precinct
10. Kings Gate Commercial Precinct
11. Green Square Commercial Precinct
12. Fortitude Valley Railway Station
13. James Street Precinct
14. Gasworks
15. Newstead Riverpark

11.2 Public Transport

Travel time into Brisbane's Central Station is just six minutes (two stops) from Bowen Hills railway station and four minutes from Fortitude Valley railway station (one stop), with trains every three minutes in peak hour. In fact, Bowen Hills railway station and Fortitude Valley railway station are two of only four railway stations through which all Brisbane suburban lines run. This means you can catch a train from Bowen Hills or Fortitude Valley to almost anywhere without having to change trains.

Apart from regular rail services, a number of bus routes from Bowen Hills service the CBD, Royal Brisbane Hospital, QUT's Kelvin Grove campus, and other destinations.
The importance of such excellent public transport connectivity should not be underestimated.

One of the many advantages of living in an established suburb like Bowen Hills is that transport and other major infrastructure already exists. It is not "proposed" or "planned" as it is in some urban renewal locations.

11.3 Employment

Within walking distance of 61 Brookes Street are several of Brisbane's largest employment nodes. Bowen Hills/Herston employs over 26,000 workers; the Brisbane CBD employs over 171,000 workers; Fortitude Valley employs over 22,000 workers; and the Newstead area employs over 11,000 workers. According to research firm Urbis, an additional 51,000 new jobs are expected to be created in Brisbane's CBD between now and 2031, and a further 27,000 across Fortitude Valley, Bowen Hills/Herston, and Newstead.

Bowen Hills is also well-connected to Brisbane's largest universities, with over 90,000 students within 5km.

Bowen Hills is an important commercial hub in its own right, in similar fashion to the relationship between North Sydney and the Sydney CBD. The national headquarters of Virgin Australia Airlines is in Bowen Hills, as well as many other major corporations such as:

- Virgin Records;
- Courier Mail / Sunday Mail;
- Nike Australia;
- NEC Australia;
- Pacific Publications;
- Pacific Gaming;

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- Singer Sewing Machines; and
- Staging Connections.

In nearby Fortitude Valley, within easy walking distance of 61 Brookes Street, are a number of major commercial centres such as Gasometer 1, Green Square, and HQ. Green Square is the largest corporate office park that has been developed in Brisbane over the past 15 years. The head offices of many major corporations are also located in Fortitude Valley or Newstead, such as:

- Aecom;
- Arup;
- Bank of Queensland;
- Cardno;
- Energex;
- Fujitsu;
- John Holland;
- Leightons;
- RPS; and

11.4 Bicycle Facilities

The development will include facilities to accommodate 130 residences and 28 visitor's bikes

Figure 11.4
Bicycle Storage

12.0 Adaptable spaces

The design allows for equitable access from street level and car parks to entrance and lift lobbies through the inclusion of DDA compliant ramps. All public amenity spaces including roof terraces are easily accessible without the need for supplemental equitable access. All lifts and lift doors will be equipped with accessibility provisions and suitably signed to Australian Standards and emergency evacuation will be provided in safe areas in stairwells. Accessible car parking bays are provided generally in close proximity to the lifts on ground level. This has been calculated at 1 per 141 of the total visitor and retail car park provision. Each accessible parking bay is 2.4m wide with a 2.4m shared area adjacent and provided with clear headroom of 2.5m with suitable signage.

Provisions have also been made to provide adaptable DDA units at a mix of 5%. Typical adaptations include wider doors that can be reverse swung or sliding as well as accessible balconies.

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13.0 Safe and diverse community

The design addresses all key aspects of the Crime Prevention through Environmental Design (CPTED) planning Policy, helping reduce the opportunity for the likelihood of crime. Some of the principal aspects of the design in this regard are:

- Exterior balconies overlook all sides of the development creating active and passive surveillance;
- The ground floor facade is set back and varied allowing for better visibility and clear sightlines around corners and across the site improving individual safety;
- Pedestrian corridors and destinations are clearly visible and legible allowing for easily discernible way-finding;
- Car park entrances and stairwell exits are electronically monitored and secured with gates. The active retail offering encourages pedestrian activity at grade level and promotes casual surveillance;
- All building entrances address the street to limit opportunities for concealment, with clear sight lines from within and without for scanning before exiting or entering.
- CCTV security systems to lobby entry, street front and rear Exhibition Street.

14.0 Informed owners and managers

To encourage and enable building managers to optimise the building's environmental performance a Simple Building Users Guide, including information relevant to the building managers, (Managers and Users) will be provided.

The Building User's Guide will include an Environmental Health and Mission Statement, for use by the facility's management to complement the facility's functional design program. This statement is to be retained by the facility with the other design data to ensure that future alterations, additions, and program changes are consistent with the intent of the environmental health and mission statement.

The Building Users Guide will include a reference section relevant to all users, staff and maintenance workers of the building outlining the basic design intent of the facility, including principles surrounding waste management, recycling, energy and water efficiency.

In addition to the building users guide being available electronically and as printed hard copy, relevant aspects from the guide will be displayed around the development in poster format.

Electricity and hot water consumption data available to the users and occupants on a www interface. Details of the www interface will be included in the Building Users Guide.