

33 Cross St
DA Report
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Client

Ashington

Advanced Environmental

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EXECUTIVE SUMMARY

The objective of this report is to provide a summary of the sustainable design process to date on the combined hotel and residential development at 33 Cross St, Double Bay and demonstrate how the Building Code of Australia sustainability requirements have been achieved.

Specifically, this report addresses:

- ESD Opportunities considered
- Initiatives which demonstrate compliance with NatHERS and BASIX requirements for the residential component (BCA class 2)
- Approach to BCA Section J for the hotel and retail components (BCA class 3 and class 6)

Design Approach

A holistic environmental design approach has been adopted for the development which balances performance across a range of environmental considerations. The sustainable design approach for the development has focused on balancing performance over the following areas:

- Energy Efficiency
- Water Efficiency
- Internal and External Environment Quality
- Materials Selections
- Sustainable Infrastructure

Compliance Requirements

The holistic design approach discussed above is aimed at providing a best practice level of sustainability. As part of such an approach, the legislative compliance requirements have been met for the BCA Section J (for classes 3 and 6) and BASIX (for class 2). The detailed strategy for achieving compliance is provided in this report. The compliance requirements are as follows:

- Class 2 (residential)
 - NatHERS Thermal Comfort Analysis
 - BASIX Energy, Water and Thermal Comfort Assessment
- Class 3 and 6 (hotel, retail and restaurant)
 - Deemed-to-Satisfy provision of the BCA Section J
 - J1 Building Fabric
 - J2 Glazing
 - J3 Building Sealing
 - J4 Air movement
 - J5 Air-conditioning and ventilation Systems

- J6 Artificial Lighting and power
- J7 Hot Water Supply
- J8 Access for maintenance

Results

The BCA Section J requirements are being demonstrated through design statement by Lincolne Scott and Architectus. The BASIX and NatHERS compliance is noted in the appended certificates, with resulting scores of:

- **Energy – 33% (exceeding the target by 13%)**
- **Water – 48% (exceeding the target by 8%)**
- **Thermal Comfort – Pass (Target pass)**

Conclusion

The holistic strategies noted in this report will combine to produce a building solution that minimises its energy and water footprint, and optimise visual and thermal occupant comfort.

This is demonstrated by the substantial improvement on the minimum regulatory requirements for sustainability.

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1 Introduction

1.1 Report Approach

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Specifically, this report addresses:

- ESD Opportunities considered
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- Approach to BCA Section J for the hotel and retail components (BCA class 3 and class 6)

1.2 Sources of information

Sources of information for this report include:

- Architectural Drawings provided by Architectus (03/08/2009)
- Façade schedule provided by Architectus (13/08/2009)
- ESD Opportunities Report by AE (17/07/2008)
- BASIX Building Sustainability Report by AE (17/07/2008)

1.3 Limitations

All strategies and initiatives presented are based on the concept design completed to date. Actual performance of the systems will depend on the final implementation of the design.

2 Methodology

2.1 Design Approach

A holistic environmental design approach has been adopted for the development which balances performance across a range of areas. Energy and water efficiency are most commonly thought of with regard to sustainable design; however, the sustainable design approach for the development has focused on balancing performance over the following areas:

- Energy Efficiency
- Water Efficiency
- Internal and External Environment Quality
- Materials Selections
- Sustainable Infrastructure

Due to the nature of the development at 33 Cross St and the diversity of use incorporated; addressing the services across the development can result in significant spatial and financial savings. The design approach has been to focus on the optimal mix of passive design, specialist building services and renewable energy generation to provide a strong ESD outcome that is commercially viable.

2.2 Compliance Requirements

The holistic design approach discussed above is aimed at providing a best practice level of sustainability. As part of such an approach, the legislative compliance requirements have been met for the BCA Section J (for classes 3 and 6) and BASIX (for class 2). The detailed strategy for achieving compliance is provided in the following sections of this report. The compliance requirements are as follows:

- Class 2 (residential)
 - NatHERS Thermal Comfort Analysis
 - BASIX Energy, Water and Thermal Comfort Assessment
- Class 3 and 6 (hotel, retail and restaurant)
 - Deemed-to-satisfy provision of the BCA Section J
 - J1 Building Fabric
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 - J7 Hot Water Supply
 - J8 Access for maintenance

2.3 NABERS for Hotels

In response to the DG query regarding consideration of the NABERS tool for hotels, the design is currently progressed to insufficient detail to accurately predict the NABERS hotel performance.

NABERS for hotels is a rating tool which assesses the energy and water performance of operational hotels; however there are no assessment methodology guidelines currently available for assessing a potential NABERS rating during design stages. As an operational tool, it depends significantly on the guest usage of water and energy, the design of the building can only have a limited impact on water and energy savings. This is especially the case in hotels, where guest usage cannot be restricted nor managed.

The final performance of any hotel is largely dependent on design decisions made by the operator; and as an operator has not yet been appointed it is not currently possible to predict the operational energy performance in line with the NABERS Hotel requirements accurately.

The hotel design has progressed to a broad conceptual level. In the interest of achieving a sustainable solution, preliminary services concepts have focused on reducing the energy and water footprint of both the hotel and residential components and these concepts will be developed in conjunction with operator when they are appointed. However at this stage, this does not inform the potential NABERS energy and water operational ratings.

As noted above, we have addressed the regulatory requirements for environmental performance through the Building Code of Australia which stipulates the minimum mandatory level of compliance.

3 Opportunities Consideration

The intent of this section is to provide a summary list of the ESD opportunities that have been considered redevelopment at 33 Cross Street, Double Bay.

ESD opportunities for site-wide infrastructure and for the individual components of the development are discussed within the ESD Opportunities Report (issued 17 July 2008). The feasibility of the key ESD opportunities identified for the residential, hotel and retail components will be assessed in further detail during subsequent design stages.

The following table is a summary of the recommended ESD opportunities for the site development.

SITE-WIDE INFRASTRUCTURE	Status
<ul style="list-style-type: none"> • Centralised HVAC and water systems. • Efficient landscaping and irrigation. • Energy and water metering. • Master electrical switches. 	<ul style="list-style-type: none"> • Included in current design • Included in current design • Included in current design • Included in current design
ENERGY	
<ul style="list-style-type: none"> • Energy efficient HVAC systems. • Mixed mode air-conditioning systems. • Controls on windows to prevent simultaneous use of air conditioning and natural ventilation. • Cogeneration or solar hot water. • Efficient lighting systems. • Time controlled HVAC and lighting for common areas. • Interactive energy and water metering systems. 	<ul style="list-style-type: none"> • Included in current design • Included in current design • Included in current design, control details to be confirmed • Solar hot water included • Included in current design • To be confirmed • To be confirmed during design development
WATER	
<ul style="list-style-type: none"> • Low flow water fittings. • Rainwater capture. • Potential for on-site stormwater detention. • Potential for on-site blackwater treatment. • Swimming pool covers or shading to reduce evaporative water loss. • Water efficient heat rejection. 	<ul style="list-style-type: none"> • Included in current design • Included in current design • Not included in current design • Not included in current design • TBC • TBC

INTERNAL ENVIRONMENT QUALITY	
<ul style="list-style-type: none"> • Natural Ventilation. • Natural Lighting. • Appropriate shading to enhance occupant thermal and visual comfort. 	<ul style="list-style-type: none"> • Mixed mode ventilation included • Included in current design • Included in current design
MATERIALS	
<ul style="list-style-type: none"> • Use of recycled concrete, steel and aggregate. • Use of recycled or FSC certified timber. • Low or no VOC paints, varnishes, adhesives and sealants. • Reduction in PVC use and replacement with alternative, less toxic materials. 	<ul style="list-style-type: none"> • All material selections to be considered during future design stages
EXTERNAL AMENITIES	
<ul style="list-style-type: none"> • Incorporation of appropriate shading for occupant thermal comfort. • Incorporation of Building Integrated Photovoltaics in feature shading in public areas. • Use of recycled water in any water features incorporated. 	<ul style="list-style-type: none"> • TBC during subsequent design stages • TBC during subsequent design stages • Not included

4 BCA Section J

4.1 Approach

The hotel, retail and restaurant (class 3 and 6) parts of development at 33 Cross St must demonstrate compliance with section J of the BCA. Section J for the residential component is covered by BASIX in NSW.

A *deemed-to-satisfy* (DTS) approach to demonstrating compliance has been selected. The DTS requirements are demonstrated as follows:

- J1 Building Fabric – Design Statement by Architectus
- J2 Glazing – Design Statement by Architectus referencing the performance requirements noted in this report
- J3 Building Sealing – Design Statement by Architectus
- J4 Air Movement – Design Statement by Architectus
- J5 Air-Conditioning and Ventilation Systems – Design Statement by Lincolne Scott
- J6 Artificial Lighting and Power – Design Statement by Lincolne Scott
- J7 Hot Water Supply – Design Statement by Lincolne Scott
- J8 Access for Maintenance – Design Statement by both Lincolne Scott and Architectus

4.2 Section J-2 Glazing

4.2.1 Methodology

This section of the report provides performance requirements for the facade to achieve compliance with J2 - glazing according to the deemed-to-satisfy conditions for the hotel, retail and restaurant portions of the development.

Glazing performance has been based on the façade schedule provided by Architectus (13th August 2009) nominating the glazed areas, shading details, floor areas and façade areas for each building class.

Glazing calculators have been prepared (and are attached) in accordance with the requirements for section J2 as follows:

- Hotel L1 (class 3): Glazing method 1 (J2.3)
- Hotel L2 (class 3): Glazing method 1 (J2.3)
- Hotel L3 (class 3): Glazing method 1 (J2.3)
- Hotel L4 (class 3): Glazing method 1 (J2.3)
- Retail/Restaurant/Hotel Lobby G (class 6): Glazing method 2 (J2.4)

4.2.2 Performance requirement

The performance requirements to achieve deemed to satisfy compliance with section J2 are:

Hotel (L1 to L3):

- U-value must be no greater than 7.0
- Solar Heat Gain Co-efficient (SHGC) must be no greater than 0.65

Hotel (L4)

- U-value must be no greater than 5.3
- Solar Heat Gain Co-efficient (SHGC) must be no greater than 0.88

Retail/Restaurant/Hotel Lobby (G):

- U-value must be no greater than 3.5
- Solar Heat Gain Co-efficient (SHGC) must be no greater than 0.25 on the north and west, 0.30 on the east and 0.6 on the south

The glazing calculators for each level and the façade schedule are provided in Appendix A. Design statements are provided in Appendix B.

5 BASIX

The residential component of the proposed development at 33 Cross Street is categorised as Class 2 as per the Building Code of Australia, and is consequently required to meet BASIX Building Sustainability targets as part of the New South Wales building approval process.

BASIX is a Building Sustainability Index produced by the New South Wales Government that sets benchmarks for thermal comfort, reduction in potable water use and reduction in greenhouse gas emissions for all residential developments within New South Wales. The benchmarks set out under BASIX vary according to location and building type, and are intended to ensure that all new residential developments constructed in New South Wales are aligned with the Government's sustainability requirements.

It is compulsory that all new residential dwellings in NSW conform to the BASIX benchmarks. Each development application for a residential dwelling must be submitted with a BASIX Certificate, and such a Certificate can be obtained if and only if the development complies with or exceeds the thermal comfort, water and energy benchmarks set out in BASIX.

The reduction targets for this development are as shown below:

- Energy – 20% reduction
- Water – 40% reduction

Using the BASIX on-line software, all of the dwellings proposed as part of the redevelopment at Cross Street were modelled to determine the system configuration required for compliance with the water and energy benchmarks set out in BASIX. NatHERS modelling has been completed to determine the thermal comfort and HVAC loads for the BASIX certificates.

The key energy and water efficiency initiatives currently included in the development are:

- Water efficient fittings and appliances
 - Rainwater collection for re-use
 - 3 star WELS showers
 - 4 star WELS toilets
 - 6 star WELS kitchen and bathroom taps
 - 5 star WELS clothes and dishwashers
- Energy efficient appliances
 - Gas-boosted solar hot water heaters
 - Central ventilation systems
 - Efficient lighting and good natural lighting
 - Gas ovens and cook tops
 - 6 star refrigerators
 - 4 star dish washers

- 4.5 star clothes washers
- Central Renewable energy Capacity
 - 200 m² Solar collector

The resulting BASIX scores are:

- **Energy – 33% (exceeding the target by 13%)**
- **Water – 48% (exceeding the target by 8%)**
- **Thermal Comfort – Pass (Target pass)**

The full set of minimum compliance requirements are provided in the BASIX certificates in Appendix C. The associated drawings, assessor's certificates and thermal specification are provided in Appendix D.

6 Conclusion

A number of design initiatives; both passive and active are proposed to reduce the overall environmental footprint of the proposed development at 33 Cross Street and demonstrate compliance with the regulatory tools of the BCA section J and BASIX.

6.1 Holistic Sustainable Design

A range of ESD initiatives have been considered for the development at 33 Cross St. A number have been included in the current design, while other have been noted for further investigation during design development.

Included in the current design are:

- All the spaces are intended to be mixed mode; the use of natural ventilation as often as possible can reduce energy consumption for air-conditioning by up to 25%.
- Most of the spaces within the residential and retail areas have access to daylight. External shading shall be incorporated to optimise daylight availability and reduce lighting energy consumption during the day.
- In order to reduce energy consumption for lighting, it is recommended that compact fluorescents are used for all primary light fittings incorporated in the retail and hotel components. This could reduce lighting energy consumption by more than 50%.
- It is recommended that all services for common areas such as lighting, HVAC, and mechanical ventilation be operated through time switches or be linked to motion sensors to reduce energy consumption when the space is unoccupied.
- Incorporating low-flow water fittings with a 4 – 5 star WELS rating would lead to a reduction of up to 50% in overall water consumption.
- Rainwater harvest alone can provide up to 35% of total non-potable water demand (excluding cooling towers).

Items which are being further investigated include:

- Renewable energy may be incorporated in the form of Building Integrated Photovoltaics that could form a visible aesthetic component of the development.
- Interactive metering would help increase awareness among occupants regarding impacts of their actions on energy and water use, and consequently promote effective patterns of use.
- Measures such as the use of low VOC materials, incorporation of appropriate internal and external shading, providing manual over-rides to all end use applications can aid in improving occupant comfort levels throughout the development.

All of the strategies listed above would combine to produce a building solution that minimises its energy and water footprint, and optimises visual and thermal occupant comfort

6.2 Compliance

Compliance with the regulatory tools is demonstrated by the design statements and BASIX Certificates in the appendices.

APPENDIX A – DESIGN STATEMENTS

APPENDIX B – GLAZING CALCULATORS AND FAÇADE SCHEDULE

APPENDIX C – BASIX CERTIFICATES

APPENDIX D - DRAWINGS, ASSESSOR'S CERTIFICATES AND THERMAL SPECIFICATION