

CUNDALL

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Environmentally Sustainable Development (ESD) Report

88 Walker Street & 77-81 Berry St

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This report has been prepared in accordance with the terms and conditions of appointment. Cundall Johnston & Partners Pty Ltd trading as Cundall (ABN 16 104 924 370) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.					
The success and realisation of the proposed initiatives will be dependent upon the commitment of the design team, the development of the initiatives through the life of the design and also the implementation into the operation of the building. Without this undertaking the proposed targets may not be achieved.					

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Executive Summary

The development proposed for 88 Walker Street and 77-81 Berry Street, North Sydney, 2060 is being designed to incorporate principles of environmental sustainability that will meet, and exceed, North Sydney Councils objective of an environmentally sustainable building.

There are two towers which form the basis of this development – one Commercial tower and one Hotel tower. Both buildings are individually targeting a high level of sustainability as well as an overall sustainability strategy being developed for the entire site, including the following performance targets:

- 5 Star Green Star Office Design (v3) Rating for the Commercial Building
- 5 Star NABERS Office Energy Rating for the Commercial Building
- 4 Star NABERS Hotel Energy Rating for the Hotel Building

This report outlines the key Ecologically Sustainable Design (ESD) initiatives proposed for this development.

Key strategies cover a broad range of environmental performance criteria, including:

- Energy conservation by optimising building façade and systems;
- Encouraging responsible energy management practices;
- Minimising greenhouse gas emissions
- Avoiding the use of ozone depleting substances;
- Mains potable water conservation is ensured by minimising consumption and the provision of a blackwater recycling plant;
- Provision of a high quality indoor environmental quality for employees, with good daylight levels and external views, a thermally comfortable environment with good air quality and low levels of indoor pollutants;
- Environmentally responsibly material selection;
- Diversion of waste from landfill;
- Low-emissions transport encouraged by provision of alternatives to fuel-intensive private vehicle use.

A significant part of the sustainable aspirations of this development is to provide a central services strategy for both energy and water to supply both the commercial and hotel buildings, taking advantage of the differing requirements of the two buildings to ensure the most efficient services selection. This solution moves beyond Green Star and NABERS in its approach to sustainability.

In addition the building is designed to be adaptable in future to respond to future legislation and technological changes to create a longer term response to climate change.

The design response to sustainability is explained in more detail in the following sections.

1 Introduction

This report outlines the key Ecologically Sustainable Design (ESD) initiatives for the proposed Commercial and Hotel development at 88 Walker Street and 77-81 Berry Street, North Sydney which is targeting a high level of environmental performance. The scope and systems described herewith cater for these performance requirements, and will be further developed through the detailed design stage.

Environmental performance will be measured according to the following sustainability ratings, which encourage environmental sustainability across a broad range of environmental indicators:

Green Star Rating:

- 5 Star Green Star Office Design v3.0

NABERS Office Energy Rating (Formerly ABGR)

- 5 Star Base Building Rating

NABERS Hotel Energy Rating

- 4Star Rating

The design response to sustainability is explained within this document according to the Green Building Council's environmental indicators, which include management, indoor environmental quality, energy, transport, water, land use and ecology, materials and emissions to land, water and air.

In addition to following the benchmark schemes of Green Star and NABERS the development is being designed for future adaptability to ensure that the buildings can be responsive to future changes in climate, legislation, technology and market perception.

The following section displays the main ESD initiatives that are being designed into each building type.

2 ESD Initiatives

	ESD INITIATIVES Commercial Building	
Management	• Full commissioning, building tuning and monitoring • Appointment of independent commissioning agent • Environmental Management Plan during construction and operation • Building user guide	
Indoor Environmental Quality	• Increased fresh air supply • Carbon dioxide sensors • Avoidance of Volatile Organic Compound emissions • Low formaldehyde wood products • High levels of daylight through facade design • High frequency electronic ballasts • Efficient air distribution • Maximise External Views	
Energy Conservation	• Minimum targeted 5 Star NABERS Office Energy rating • Energy monitoring • High performance facade • High performance plant selection • Extensive metering	
Transport	• Excellent public transport links • Transportation and Travel Guide • Provision of cyclist facilities for staff and visitors	
Water Conservation	• High Efficiency water fittings • Blackwater recycling for cooling towers, toilet flushing and landscape irrigation	
Materials	• Preference for environmentally responsible materials • Low embodied energy & high recycled content • Minimise Volatile organic compounds • Dedicated waste recycling room	
Emissions	• 100% of all refrigerants will have an Ozone Depletion potential of zero. • All insulants to have zero ODP • Integrated refrigerant leak detection • Filtered stormwater runoff	

ESD INITIATIVES Hotel Building	
Management	Waste management during demolition and construction. 80% of waste to be reused / recycled.
Indoor Environmental Quality	- Avoidance of Volatile Organic Compound emissions - Low formaldehyde wood products - High levels of daylight to Hotel rooms - High frequency electronic ballasts - Efficient air distribution 
Energy Conservation	- Combined plant with the commercial building to ensure maximum efficiencies - Energy monitoring - High performance facade - High performance plant selection - Extensive metering
Transport	Excellent public transport links 
Water Conservation	- High Efficiency water fittings - Blackwater recycling for cooling towers, toilet flushing and landscape irrigation
Materials	- Preference for environmentally responsible materials - Minimise Volatile organic compounds 
Emissions	100% of all refrigerants will have an Ozone Depletion potential of zero. - Integrated refrigerant leak detection - Filtered stormwater runoff

3 Green Star

Green Star is a comprehensive sustainability design tool which assesses the environmental impact of a building over a range of environmental indicators, from management and ecology to energy and water use, material selection and waste production. Categories are weighted according to their environmental importance, which varies between building sectors and across States.

Points are awarded in the following categories:

- Management
- Indoor Environmental Quality
- Energy Conservation
- Transport
- Water Conservation
- Land use & Ecology
- Materials
- Emissions

There are several different rating tools available under the Green Star scheme and these included, Office Design, Office As Built, Industrial, Retail and Education. However there is no specific Green Star Tool applicable to the Hotel building of this development.

The Commercial building component is being designed to achieve a 5 star rating under the Green Star Office Design Rating Scheme v3.0. As there is no applicable tool for the Hotel component this cannot be officially rated, however due to the nature of this development it is intended that many of the Green Star principles applied to the commercial building can also be applied to the Hotel building.

The following sections indicate the strategies proposed for the Commercial building within each of the Green Star categories. Where possible some of these strategies will be carried across and implemented within the Hotel building.

4 Management

4.1 Environmental Design Experience

The consultant team includes the services of experienced environmental design consultants who in addition to being Green Star and NABERS Accredited Professionals, have extensive experience in the delivery of environmentally responsive commercial buildings.

4.2 Commissioning & Building Tuning

Commissioning is an integral part of the project delivery process, ensuring optimum comfort control, building services performance and operational efficiency. The Green Star design tool recognises the importance of commissioning in delivering a successful building that performs as it was designed to, and therefore gives credit for good commissioning practice.

The following will be implemented for this development:

- Contractual requirement for comprehensive pre-commissioning, commissioning and quality monitoring of building services installations;
- Commitment to a 12 month commissioning / building-tuning period after handover, comprising of quarterly reviews and recommissioning at the end of the 12 months;
- Appointment of an independent commissioning agent to check commissioning practice.

4.3 Waste Minimisation & Environmental Management

An Environmental Management Plan will be developed to regulate the environmental impacts of the development during construction and operation. This will include a Waste Management Plan, stipulating a minimum of 80% of demolition and construction waste to be recycled or reused.



4.4 Handover & Education

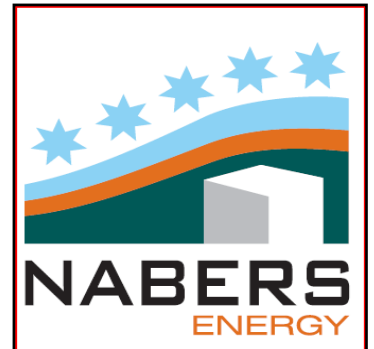
In recognition of effective handover being critical to the success of a building in achieving its environmental aspirations, a simple and concise building users' guide will be developed to inform and educate staff and facility management staff on how to capture and promote strong on-going environmental performance.

5 Energy Conservation

5.1 Energy Efficiency Targets

Energy conservation is a priority in the proposed commercial building. A strong energy reduction strategy above and beyond that of a standard commercial building is being proposed.

This commercial building is being designed to target a 5 Star NABERS Office Energy (Base Building) rating.



NABERS Energy assesses a building's energy performance based on annual measured energy consumption. In order to ensure that the building performs as expected, the design is modelled using energy simulation software at significant stages throughout design and construction.

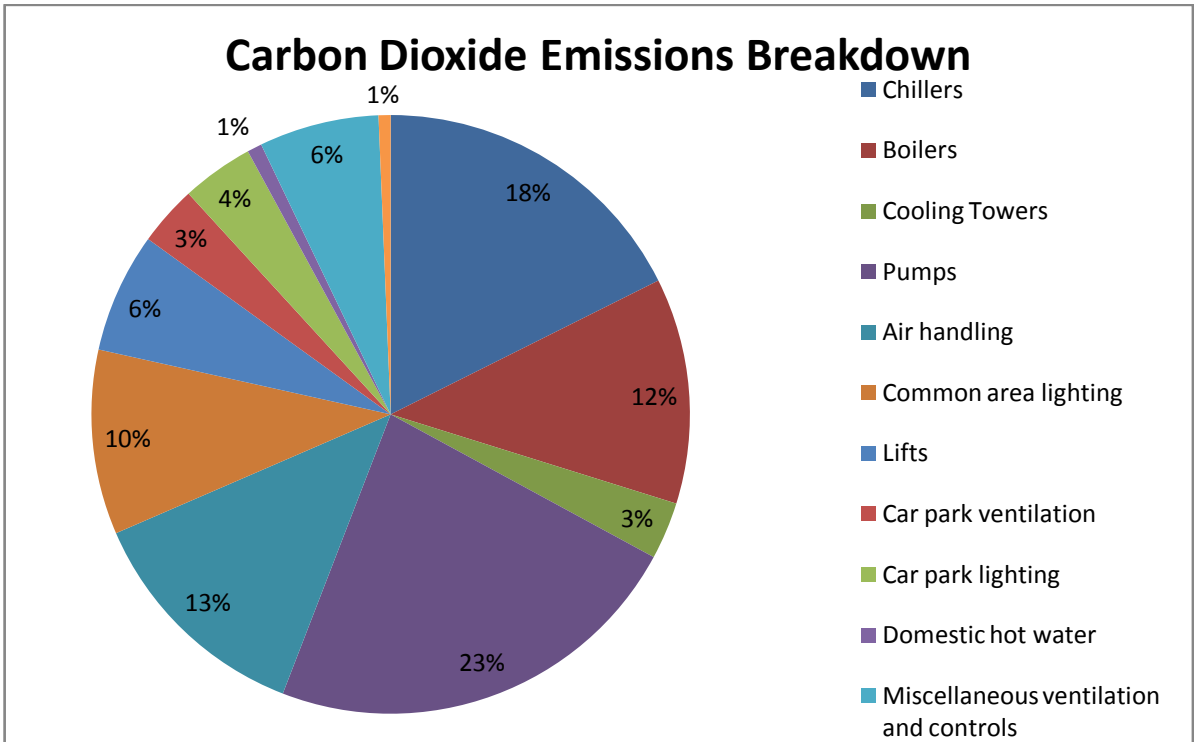
Current market analysis indicates that a 2.5 – 3 Star NABERS rating is the standard amongst commercial buildings. Therefore a 5 Star rating represents a significant improvement on this benchmark.

This high rating will be achieved by combining high performance glazing with external shading and an innovative facade design, combined with energy efficient systems and services to reduce the energy use and therefore greenhouse emissions of the building.

In addition, the building services and fabric will be developed to meet the requirements for the BCA Section J: Energy Efficiency, which covers air-conditioning, ventilation, lighting, power and hot water, as well as building fabric considerations including thermal construction and insulation, building sealing, glazing and shading for commercial and retail development.

As part of the overall energy efficiency of the development a combined services strategy is being proposed for the Hotel and Commercial buildings. This will ensure that the maximum efficiencies can be achieved and the best advantage can be taken of the different load profiles and operating requirements of the two individual buildings.

Preliminary modelling has been undertaken on the proposed design to ensure that this target is both realistic and achievable. The design has focused first on reducing the energy demand through a high performance facade and then on the means of delivering this energy through high efficiency services. The pie chart on the following page indicates the breakdown of carbon emissions for the proposed commercial building:



As the chart above shows a significant proportion of the carbon emissions associated with the building can be attributed to the air conditioning, as is typical for a building such as this. The air conditioning has been limited through the facade design and selection of efficient plant and services.

Whilst common area lighting and carpark energy still represents a large proportion of the total carbon emissions these have been reduced against typical scenarios through efficient lighting design and controls.

The central plant proposed for supplying both the Hotel and Commercial buildings is further contributing to the reduction in carbon emissions compared to a typical development.

5.2 Facade performance

Attention has been given to façade performance, in order to control excessive solar heat gains while maximising the availability of glare-free daylight. A combination of high performance glazing with external shading will reduce solar heat gains and cut cooling loads considerably. The glazing selection will be a high performance with a shading coefficient of less than 0.3. In addition the following external shading will be provided:

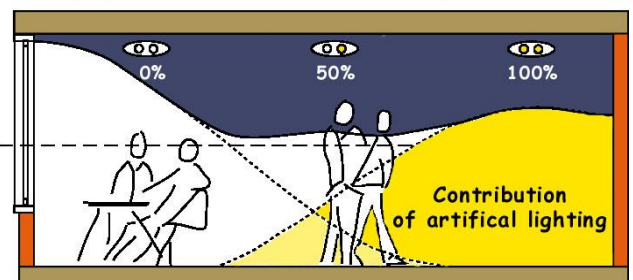
- A mesh shading system on the southern ends of both the East and West facing facades.
- Horizontal shading to the northern ends of the East and West facing facades

5.3 Energy Efficient Systems

The building will be energy efficient in design and ongoing operation. The following initiatives will improve the energy performance of the building:

- Energy efficient air-conditioning system. The proposed system will be a hybrid system with active chilled beams in the perimeter zones and low temperature VAV in the internal spaces.
- A highly efficient lighting design and fully addressable lighting control strategy will reduce artificial lighting energy consumption and allow maximum advantage to be taken of daylight. This in turn will also help to limit the heat gains associated with lighting and thus the air conditioning loads.

Daylight and Artificial Lighting Integration



5.4 Monitoring & Tracking

To enable the effective monitoring and tracking of energy consumption, sub-metering will be provided to every floor of the building, as well as to energy uses greater than 100kVA. Individual sub-meters will be provided for light and power. This will help identify areas of inefficiency in operation with potential for improvement.

6 Water Management

6.1 Water Efficient Fittings

Efficient fittings and fixtures will be selected to considerably reduce potable water demand. Where available 6 Star fittings will be selected which have been rated under the Water Efficiency and Labelling Standards Scheme. A 6 Star fitting is deemed to have “an excellent level of water efficiency”.



6.2 Blackwater Recycling

Blackwater recycling is proposed for the whole development to take advantage of the large volumes of water which will be available for re-use on site. Blackwater will be utilised to serve the following commercial building water supplies:

- Cooling tower water
- Toilet flushing
- Landscape irrigation

Cooling towers can typically represent up to 30% of a typical commercial buildings potable water consumption. Implementing such a scheme has the potential to significantly reduce the potable water demand of the commercial building.

6.3 Stormwater Quality & Quantity

Quality of stormwater will be improved by filtering for storm events up to 1 in 20 years, thereby reducing run-off from site into waterways.

6.4 Tracking and Monitoring

Sub-metering on major water uses will reduce the considerable water losses that occur in many commercial buildings through leakage. Meters will be connected to the BMS for leak detection purposes.

7 Indoor Environmental Quality

The proposed design will place particular emphasis on achieving a high quality working environment through careful consideration of the following influencing factors on staff comfort:

7.1 Indoor Air Quality

Good indoor air quality is ensured by improving ventilation and reducing indoor contaminants.

In the proposed commercial building ventilation will be improved through applying the following strategies:

- Fresh outside air supplied at rates 50% higher than Australian Standard AS1668.2 – 1991.
- Individual tenancy exhaust risers to remove indoor air contaminants locally from photocopy rooms etc;
- Carbon dioxide sensors to monitor carbon dioxide levels, and increase fresh air supply rates if carbon dioxide levels become undesirably high.

Contamination of air by common indoor pollutants will be reduced by careful material selection, for example:

- Avoidance of Volatile Organic Compound (VOC) emissions by selecting carpets and paints with a low VOC content;

7.2 Light Quality

Daylight

The building is being designed to maximise the natural light potential through selecting a façade with high light transmission properties.

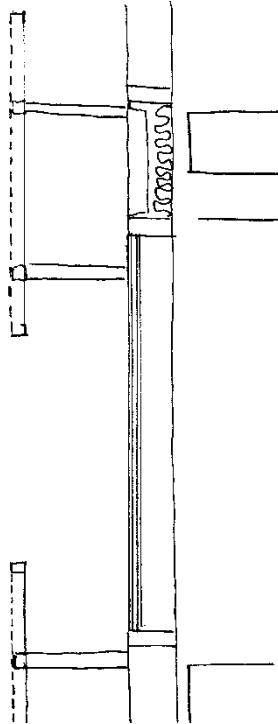
Electric Lighting

High frequency electronic ballasts will improve office amenity by avoiding the strain caused by low frequency flicker.

7.3 Thermal Comfort

Thermal comfort is affected by air conditioning, air movement and façade performance, as well as individual occupant factors. The design of the air conditioning systems will be such as to provide the required thermal comfort levels in the space. The main feature in maintaining good thermal comfort levels within the space is the design of the facade. It is essential to reduce solar gain into the space to reduce the radiant temperatures, especially adjacent to the facade, whilst still allowing high levels of daylight into the space.

The proposed development will incorporate a high performance façade to improve comfort conditions. The following sketch shows the proposed facade for the northern ends of the east and west facing facades



The proposed facade is to have a high performance glazing specification combined with a perforated screen to provide shading from direct sun and reduce the amount of solar gain into the space. This will mean that the radiant temperatures adjacent to the facade are reduced and will help contribute to good levels of thermal comfort. The perforated screen means that high levels of light will still be available to the space and the views will not be compromised.

7.4 External Views

Employees will have good access to external views, with over 60% of the NLA located within 8m of vision glazing.

7.5 Internal Noise Levels

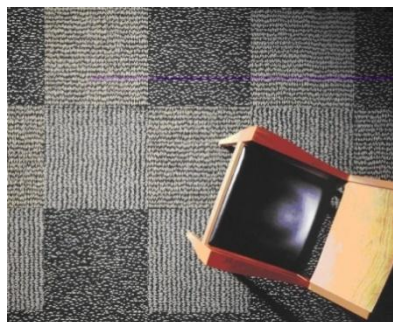
Internal noise will be restricted to acceptable levels according to limits specified by the Green Star Office Design tool, including general building and services noise.

8 Materials & Waste

8.1 Materials Selection

Preference will be given to environmentally responsible materials during the selection process, according to the following principles.

- Avoidance of environmentally sensitive products - For example, timber used in the design will be sourced from sustainable sources where possible, such as sustainable plantations or post-consumer recyclers.
- Preference given to materials with a low embodied energy & high recycled content. A proportion of cement will be replaced with an industrial waste product, reducing the huge embodied energy impacts of Portland cement production. In addition, where feasible, steel used in the design will have a post-consumer recycled content of greater than 50%
- Low impact on the indoor environment –The project will minimise the use of volatile organic compounds (VOC's) and formaldehydes in internal materials and finishes (e.g. floor coverings, furniture, paint, etc.).



8.2 Waste Minimisation

A dedicated waste recycling room will allow space for the separation and storage of recyclable waste during the building's operation.

In addition, as part of the Waste Management Plan, 80% of construction waste will be diverted from landfill for recycling or reuse.

9 Transport

9.1 Accessible Location

The site is in an accessible location, and is well-served by an extensive public transport network, including regular bus services and a frequent rail service.

9.2 Encouraging Sustainable Transport Use

The project places emphasis on sustainable transport opportunities. To encourage staff to cycle to work, secure and accessible bicycle storage will be provided for building staff, including accessible showers, lockers and changing facilities. In addition, cycling facilities will be provided for visitors to the building.



Twenty five percent of car spaces provided will be sized and labelled for small vehicles, encouraging the use of smaller, less emissions-intensive private vehicles. 10% of spaces will also be labelled for mopeds / motorbikes.

9.3 Transport Travel Guide

A workforce travel package will be developed, to inform building occupants of their sustainable transport alternatives, including:

- Shortest and safest pedestrian routes to public transport stops;
- Information on established and proposed bicycle routes serving the North Sydney area, as well as connections to this site;
- Information on on-site bicycle storage options and available shower, change and locker facilities;
- Information on public transport service frequency and stop locations.

10 Emissions

Emissions to air, land and water will be managed using the following strategies:

- 100% of refrigerants by volume will have an Ozone Depletion Potential of zero; and integrated refrigerant leak detection will ensure early identification of leaks;
- All thermal insulants used in the design will have a low Ozone Depletion Potential in their manufacture and composition;
- Stormwater runoff will be filtered in accordance with Victorian EPA Best Practice Guidelines, reducing contamination of waterways by rubbish and gross pollutants;
- Estimated wastewater discharge to sewer is significantly reduced relative to a standard building through the implementation of water efficiency measures including the proposed blackwater treatment plant.
- External light pollution will be controlled by careful lighting design

11 Hotel Strategies

In addition to being designed and constructed in line with the overall site sustainability objectives, the Hotel building will have specific ESD principles applied.

11.1 Green Star

As there is no official Green Star tool applicable to a Hotel building, the development will not be able to be officially rated under Green Star. However many of the strategies which are being applied to the Commercial building will be carried across and implemented where possible in the Hotel development as it is seen by the developed as good practice. These will include the following:

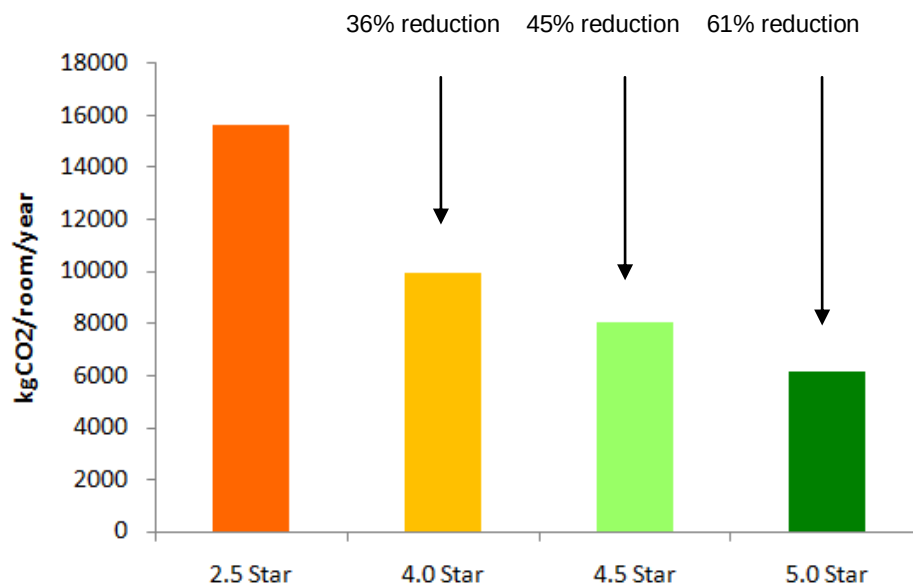
- Waste management during demolition and construction
- Appointment of an ISO14001 certified contractor with an Environmental Management Plan in place
- Energy reduction compared to a typical hotel through the utilisation of central plant for the whole development
- Specification of a high performance facade to limit air conditioning loads whilst providing maximum access to views and daylight
- Avoidance of volatile organic compounds
- Avoidance of insulation with ozone depleting potential
- Avoidance of refrigerants with ozone depleting potential
- Reduction in potable water used for cooling and toilet flushing through the use of a blackwater recycling system
- Responsible materials selection policy

11.2 NABERS Energy for Hotels

Prior to May 2008 the NABERS suite of tools only included for Residential and Commercial buildings. In May 2008 a new tool for Hotels was released, similar to the NABERS Energy and Water for Offices tools. At this point no Hotels have been officially rated under this new tool, however the indications from the Department of Environment and Climate Change (DECC) are that the market average for Hotels would be 2.5 Stars.

The aim for the Hotel building in this development is to exceed the market average levels in terms of a NABERS benchmark and to aim for a 4 Star NABERS Hotel rating in operation.

Preliminary calculations have indicated that significant energy reductions will be required in order to achieve a high NABERS rating. The chart below indicates the savings required:

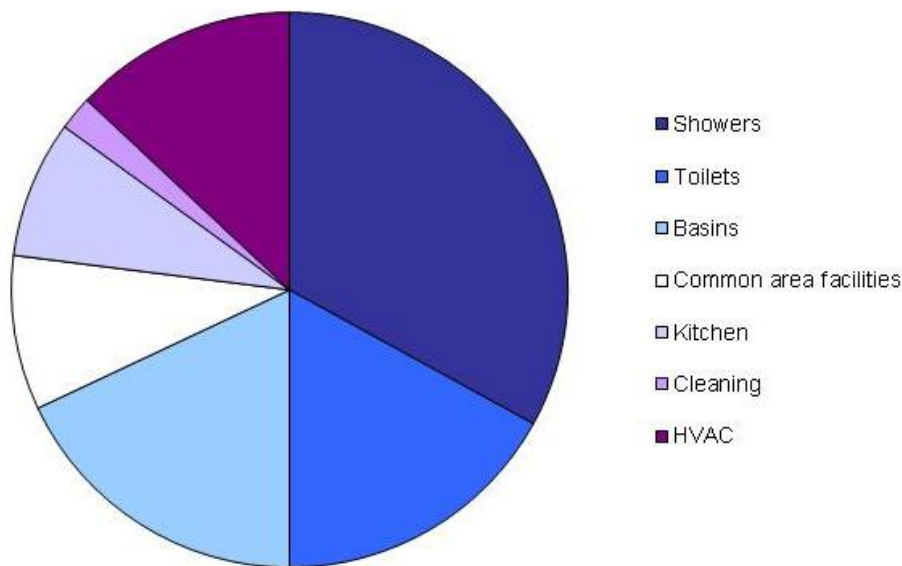


In order to achieve these high percentage reductions in comparison to a typical Hotel, the following strategies are being investigated for inclusion:

- Site wide combined services strategy will improve efficiencies in the design
- High efficiency chillers with variable speed drives
- High efficiency motors
- Variable speed drives on all fans and pump motors
- High efficiency gas fired hot water generators for space heating
- Separate air conditioning systems for each functional space
- CO₂ demand ventilation for any high occupancy spaces
- Occupancy controls and interface with point of sales system to ensure maximum operational efficiencies

11.3 NABERS Water for Hotels

Similarly to achieve a high NABERS for Hotel Water rating a significant reduction in potable water consumption will be required. Preliminary analysis of the likely water consumption for the Hotel building has indicated the following breakdown:



Hotel Water Use Breakdown

Therefore in order to target a reduction in this potable water the following strategies are being proposed:

- Water efficient fittings - selection of water efficient fittings
- Blackwater recycling for supplementing toilet flushing and cooling towers which will significantly reduce potable water demand

12 Implementation of ESD Strategies

ESD strategies will be key throughout all phases of this development, from initial concept design phases through to construction and ongoing as part of building management. The following sections outline how ESD principles have and will be incorporated through the various phases of design:

12.1 Design Development

ESD principles have been incorporated from the earliest stage of design as part of an integrated design approach. Both the Green Star and NABERS Energy rating schemes have been considered in the appraisal of this development.

An integrated design process is crucial to delivering sustainable buildings. It is the process by which all of the design variables affecting one another are considered together and resolved in an optimal fashion. Often referred to as holistic design, it looks at the entire building as a whole, with the emphasis on integrating the different aspects of the building design.

Daylighting, ventilation and water conservation, for example, cut across multiple disciplines. Daylighting in particular affects virtually every design discipline, including architecture (building envelope and orientation), mechanical (reduced internal heat loads and modified fabric loads), electrical (lighting design and lighting controls), structural (floor-to-floor heights and external shading) and interiors (interior colours and reflectivity). It is therefore essential that an integrated design approach is taken with ESD from the earliest stages.

Cundall have developed and implemented a “Green Plan” successfully on many developments which is used to track the progress of the agreed ESD principles and ensure that they are considered throughout the design. Such strategies are already in place with regards to this development to ensure that all initiatives are tracked throughout the design phases.

12.2 Construction Phases

It is important throughout the construction phase that all of the proposed ESD strategies are successfully realised. As such the following strategies are to be applied during and after construction:

- Contractors to have, where possible, an Environmental Management Plan (EMP) and be ISO 140001 Accredited to ensure that all environmental principles are upheld and adhered to throughout.
- ESD principles communicated effectively to all contractors and subcontractors on site
- Monitoring of all materials used on site, to ensure all are compliant with the relevant ESD principles
- Monitoring of waste management and recycling targets

12.3 Ongoing operation

The ongoing management of building operations is essential to ensure that the aspirations for the development are implemented in practice. Additionally environmentally sound management practices will help to reduce energy and water consumption and waste generation and reduce operational running costs.

The following strategies will be incorporated following occupation of the building:

- Production of a tenant users guide will help to communicate effectively to the users of the building how to operate the building in the most efficient manner. Additionally this will also contain information on transport routes to encourage staff to seek alternative means of transport.
- Monitoring of ongoing energy and water consumption and waste generation. Monthly monitoring of building resources will help to identify any problems and can ultimately help in reducing emissions associated with the building use.
- Review of ESD strategies – those strategies incorporated into the design will be reviewed and lessons learned can be identified. This is important as it can help to inform future decision making.

13 Future Flexibility

A key focus for this development and in particular the commercial building is to ensure that future flexibility is built into the design so that the life of the building can be extended and adapted to suit the demands of tenants in 10-15 years time. Many external influences may effect how the building is forced to operate in future. These can include:

- Climate change
- Legislation change
- Market requirements
- Technology improvements

A number of strategies are being incorporated which will aid this future flexibility. Early inclusion of these strategies will ensure that the building is able to adapt in future saving time, materials, energy and cost in upgrades and renovations. These strategies include:

- Flexible facade design to allow for future openable windows and doors to be retrofitted without needing to remove the facade mullions and transoms
- Flexible space planning within the basement areas to allow easy adaptation of the central plant to include future needs and technologies
- Designing electrical infrastructure to allow for simple future installation of photovoltaics (PVs) or similar technologies

Future design thinking has been incorporated at the start of the project to ensure that the design team continues to consider future flexibility during the continuation of the design process.