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PTI Architects

Lindfield Retail and Residential Development

ESD Report

October 2010

Revision 1

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

PTI Architecture has engaged GHD to assess the Ecological Sustainable Design (ESD) features of the retail and residential development at Lindfield. These initiatives attempt to minimise the environmental impacts caused by the construction and operation of the development. This assessment is based on the DA drawings provided by PTI Architecture.

The following ESD principles have been addressed:

- Energy efficiency.
- Water strategies to minimise potable water consumption.
- Improved Indoor Environmental Quality (IEQ).
- Waste minimisation.
- Transportation.
- BASIX Certificate.

2. ESD Strategy

2.1 Building Envelope

The building envelope is a critical to the thermal performance of the building. It has been designed to block solar radiation during the summer months while optimising daylight and minimising glare. It also has adequate openings to allow effective natural ventilation. This will provide thermal comfort to occupants with minimal energy consumption.

The envelope design is constrained by the orientation of the site and the available space. Internal layouts have been arranged so as to provide natural day lighting and suitable solar access into the primary living spaces. The following table describes the sustainable design initiates that have been incorporated into the building envelope.

Table 2-1 Architectural ESD Initiatives

Initiative	Benefit
Use of fixed shading devices particularly on the south-west façade (See Section 3.4).	Reduced heat gains from solar radiation, reduction in HVAC loads.
Use of low-e glazing materials particularly where sufficient shading cannot be implemented.	Reduced heat gains from conduction and solar radiation.
Extensive and appropriate use of thermal insulation on all external walls, roofs and suspended floors.	Reduced heat transmittance into building, reduces HVAC operating costs.
Provision of dedicated bicycle spaces for visitors to the building.	Health benefits from cycling, reduction in car usage.
Provision of dedicated small car parking spaces.	Promotes use of smaller more fuel efficient cars.
Provision of Outdoor Communal Facilities for apartments including a small garden and seating.	Enables residents to engage in outdoor activities.

2.2 Water

Conserving our scarce water resources helps reduce the need to dam rivers, reduces wastewater volumes to be treated at sewage plants and reduces energy requirements for treating and transporting water. The following strategies will be implemented to minimise potable water consumption:

Table 2-2 Water ESD Initiatives

Initiative	Benefit
Rainwater harvesting and reticulation to toilets.	Reduction in potable water usage for toilet flushing.
Installation of water efficient fittings and fixtures with the following WELS ratings: – 3 star shower heads – 4 star toilets – 5 star kitchen and bathroom tap-ware	Reduction of potable water usage.
Insulation of hot water pipe work to reduce losses.	Reduction in energy usage for hot water supply.
Treatment of stormwater leaving site using Water Sensitive Urban Design principles.	Compliance with council requirements and reduction of pollutant loads on stormwater system.

To reduce potable water consumption within the development, rainwater will be harvested from the roofs sized to meet toilet flushing requirements of the residential section of the development. The toilet water consumption of the residential section of the development is estimated to be 3528L/day, assuming four 3.5L flushes per person per day. A 40,000L central rainwater tank will be provided and supplied with rainwater from a minimum of 1500m^2 of roof area with mains top-up. This will supply water to residential toilets only, allowing on average 1200L/day of demand to be met by rainwater..

2.3 Energy

It is essential to ensure the building is designed and built to minimize energy consumption and reduce greenhouse gas emissions. The following energy efficient measures have been included in the design.

Table 2-3 Mechanical ESD Initiatives

Initiative	Benefit
Central hot water – natural gas water heater, supplemented by 40m2 of solar hot water panels.	Reduction in energy usage for water heating.
Installation of 4 Star single-phase air-conditioning install to living areas of each dwelling.	Reduction of energy consumption through high Star rated air-conditioning system.
Variable Speed Drives on carpark exhaust fans.	Reduction in energy use for carpark exhaust.
CO (Carbon Monoxide) demand ventilation.	Reduction in energy use for carpark exhaust.

Table 2-4 Electrical ESD Initiatives

Initiative	Benefit
Use of best practice lighting systems with T5 fluorescent luminaires, and compact fluorescent lighting where appropriate.	Reduction in lighting energy use from standard fittings.
Use of daylight and occupancy sensors to control lighting in outdoor areas.	Reduction in energy consumption from lighting in areas that are unoccupied or where sufficient daylight is present.
Use of motion sensors after hours for carpark lighting.	Reduction in energy consumption from carpark lighting.
External lighting shaded from night sky.	Reduction in lighting pollution.

2.4 Indoor Environmental Quality (IEQ)

It is important to reduce indoor air pollutants to improve occupant health outcomes. Implementation of the following recommendations will improve the IEQ of the development.

Table 2-5 IEQ Design

Initiative	Benefit
Generous openable window areas.	Allow high levels of fresh air to improve indoor air quality, while improving thermal comfort through summer.
Large windows and appropriate layouts.	Natural day lighting and solar access into the primary living spaces. Use of sliding louvers on the south west façade to provide sufficient shading and privacy.
Low-VOC materials & equipment.	Reduces material off-gassing and sources of internal air pollutants.
Minimise formaldehyde content in composite wood products.	Reduces material off-gassing and sources of internal air pollutants.

2.5 Waste minimisation

The following initiatives will be implemented to avoid waste going to landfill.

Table 2-6 Waste Considerations

Initiative	Benefit
Waste Management Plan to ensure recyclable elements are separated out of construction site waste streams and collected throughout the construction process.	Reduction of construction waste through recycling.

2.6 Transportation

The transport sector is a major contributor to pollution and the consumption of natural resources. The development is in a location easily accessible by public transport. The following additional transportation measures are to be implemented:

Table 2-7 Transportation Design

Initiative	Benefit
Provision of dedicated bicycle spaces for visitors to the building.	Health benefits from cycling, reduction in car usage.
Provision of dedicated small car parking spaces.	Promotes use of smaller more fuel efficient cars.

3. BASIX

All new dwellings constructed in NSW are required to comply with BASIX. The aims of the BASIX system are to ensure that new dwellings are efficient in their use of energy and water and provide sufficient levels of thermal comfort to occupants in the most energy efficient manner.

BASIX has set targets for potable water use and greenhouse gas emissions to ensure new dwellings use fewer resources than existing dwellings in NSW. The BASIX targets vary for each local climate zone.

AccuRate is a second generation NatHERS software approved for use for BASIX thermal comfort simulations. GHD has used this software to model each of the proposed dwellings in the Lindfield development.

Local Climate

The Sydney area has a temperate climate with mild to warm summers and cool winters. This calls for good passive design to minimise heating and cooling energy use, which also aids compliance with BASIX.

3.1 Water

The development has been assessed based on preliminary information provided to GHD. The units can comply with BASIX by implementing the following water efficiency measures.

The following WELS rated fittings and fixtures will be provided:

- 3 star shower heads.
- 4 star toilets.
- 5 star kitchen and bathroom tap-ware.

A 40,000L central rainwater tank will be provided and supplied with rainwater from a minimum of 1500m^2 of roof area. It will supply water to residential toilets only, allowing an average of 1200L/day of the daily demand of 2800L/day to be met by rainwater. The tank will be topped-up from mains supply during extended dry weather periods.

3.2 Energy

The BASIX energy targets cover energy use from hot water, lighting, clothes drying, heating, cooling, ventilation and cooking. The heating and cooling component of the energy target is impacted by the thermal comfort simulation. A number of iterations are typically required between active heating and cooling selections on the energy page and the passive heating and cooling results of the ‘thermal comfort’ simulation page to achieve compliance with the energy target for each dwelling.

BASIX does not accept the provision of 'no active heating and cooling systems' alone as suitable evidence for compliance with energy targets. BASIX assumes if heating and cooling of a dwelling is required but none is provided occupants will purchase cheap and therefore usually inefficient heating or cooling systems to maintain suitable levels of thermal comfort. The purchase of inefficient heating and cooling systems would create more greenhouse emissions than providing energy efficient systems as part of the building during construction.

Energy Compliance

The following assumptions have been made to assess compliance to the energy targets of BASIX.

Hot Water:

- Central natural gas hot water is supplemented by solar hot water panels

Ventilation:

- Exhaust fans to bathrooms and kitchens have self closing dampers

Heating and Cooling:

- Ceiling fans are provided to living and bedroom spaces of all dwellings
- 4 Star single-phase air-conditioning systems are provided to living areas

Lighting:

- Compact fluorescent lighting is to be provided throughout all dwellings

Cooking:

- Kitchen are to be fitted with electric cook tops and electric ovens
- Fridge spaces are to be well ventilated

Clothes Drying:

- Provide a private indoor or sheltered clothes drying space for each dwelling

Provided that the above assumptions are implemented, an energy reduction of 49% is achieved, well in excess of the 30% target required by BASIX.

3.3 Thermal Comfort

The following modelling assumptions have been used in AccuRate in undertaking the thermal simulations for all units:

Floors:

- Suspended concrete slab

External Walls:

- Concrete internally lined with R1.5 glass fibre insulation and plasterboard

Internal Walls:

- Plasterboard on studs

Ceilings:

- Concrete Slab

Roofs:

- Insulated to R3.0

Floor Coverings:

- Ceramic tiles to kitchen, bathroom and laundry areas
- Carpet to living areas and bedrooms

Windows (as indicated on the ABSA certificates):

- Generic 10: Aluminium single-glazed: low-e glass: U=5.7, SHGC=0.47
- Generic 11: Aluminium improved single-glazed: low-e glass: U=4.32, SHGC=0.47

Thermal comfort simulations have been undertaken by Katy Gregory who is an ABSA accredited professional.

With these thermal comfort and energy assumptions, the BASIX tool requires the thermal loads for each dwelling to be less that 66 MJ/m^2annum for heating and less than 59 MJ/m^2annum for cooling. The average maximum load for each building needs be less than 51 MJ/m^2annum for heating and 45 MJ/m^2annum for cooling.

Compliance with these requirements is demonstrated in a separate BASIX report.

4. Conclusion

This report has outlined the ESD initiatives for the Lindfield Development and how it has met the BASIX requirements. These initiatives are aimed at improving energy efficiency, reducing potable water consumption and providing a healthy and comfortable indoor environment to building occupants.

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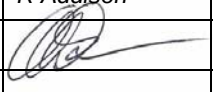
1	K Gregory	P Shield		A Sneddon		29-10-2010