Crown Prosha Joint Venture

Eastlakes Shopping Centre Redevelopment

ESD Report

Report No. 20C-11-0069-TRP-265538-1
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Eastlakes Shopping Centre Redevelopment ESD Report	
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EXECUTIVE SUMMARY

VIPAC Engineers & Scientists Ltd. has been commissioned by Crown Prosha Joint Venture to address the Director General's Requirement no 7 for the proposed Eastlakes Shopping Centre Redevelopment development in terms of its design, construction and ongoing operation.

The proposed development comprises of:

- Basement car parking
- Ground Level Shopping Centre
- 82 serviced apartments and 361 residential apartments on top of the landscaped Podium

The proposed development will incorporate both passive and active energy saving features.

In response to the Department of Planning Director General's ESD requirement, this report will outline proposed ESD measures such as water conservation, energy efficiency, recycling and waste.

The building in general will have the ability to stabilise changing thermal conditions and reduce diurnal (day-night) temperature changes if attention is paid to design details at the wall interfaces.

The following observations have been made regarding the sustainability features within the proposed development:

- The development complies with SEPP 65, BASIX and BCA Section J
- Use of light colouring for the internal walls to maximise the use of natural daylight
- Rainwater harvesting tank for landscape irrigations
- Use of External Wall insulation
- Use of Roof/Ceiling Insulation
- Use of water and energy efficient appliances
- Use of Air-conditioning systems with high coefficient of performance

Recommendations regarding lighting, appliances, internal finishes and waste etc. have been made within the body of the report.

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1. ECOLOGICALLY SUSTAINABLE DEVELOPMENT

1.1 USE OF RENEWABLE AND LOW-IMPACT ENERGY SOURCES

The feasibility of a series of renewable and low-impact energy options is considered for this project.

1.1.1 Green Power

Green power works by the consumer paying a premium for their electricity. The retailer then agrees to buy this same amount of electricity from an accredited 'green' generator (e.g. biomass, wind, solar, hydro). Major advantages of this scheme over installing onsite generation is that the additional cost of green electricity is spread over many years, not in one large up front cost. Green Power is available from a number of Green Power suppliers. More information can be found at http://www.greenpower.com.au/go/suppliers.cgi.

However, it is not practical for this type of development for the building owner to sign up for green power as the power bill will be split to each individual tenant. However, the building owner can encourage the tenants to sign up and off set their own electricity supply with green power.

For BASIX Compliance, the proposed development will need to install Photovoltaic System with rated electrical output of 26.8 peak kW (solar collector areas approximately 200 m^2, based on 1 panel of 1.3 m^2 generates 0.175 kW). The electricity generated can be used for common areas lighting purposes to reduce peak demand and any excess power can be sold back to the grid.

Please refer to VIPAC's BASIX report for further details.

1.1.2 Air Conditioning and Mechanical Ventilation

As per the advice from WSP, the mall areas are proposed to be naturally ventilated where achievable, with other areas air-conditioned as appropriate (concealed condenser water packaged units). The mall area will have a tempered air environment resulting from spill conditioned air from the adjoining retail tenancies and mixing with ambient air. The internal environment will be consistent with a shaded 'outdoor' feel.

The proposed apartments within the development will be provided with single-phase air conditioning with 3.5 star rating (as per new energy labelling standards for air conditioning). The proposed air-conditioning systems will enhance the energy performance of the development and reduce greenhouse gas emissions.

Please refer to VIPAC's BASIX and BCA Section J reports for further details on air conditioning and mechanical ventilation commitments.

1.1.3 Hot Water Systems

The hot water system being considered is to be confirmed, however it is recommended that gas be considered. In Sydney, use of abundant natural gas versus electricity for hot water is recommended from an energy efficiency point of view. The sole use of electricity, as the energy source for conventional electric water heaters are inefficient because electricity is a secondary source, deriving its energy after burning coal from the power stations, while coal based systems require expensive handling equipment and specialised pollution control systems.

The proposed apartments within the development will be provided with individual 6 Stars Gas Instantaneous Hot Water System. Please refer to VIPAC's BASIX report for further details.

With respect to the possible use of on-site hot water in the form of solar thermal technology for this development, the following is noted:

- The amount of solar collectors to provide adequate power for water heating could be accommodated by the available roof area, However the amount of collector piping, system hydraulics and pumps, storage facilities and auxiliary heating systems would be expensive and, potentially unreliable, for a development of this type given today's technology.

VIPAC therefore recommends that Solar Hot Water is not a feasible option for improving the environmental sustainability of the development.

1.1.4 Lighting

Lighting levels should be established using the guidelines set out in Australian Standard AS1680.1-1990.

Complying with the Australian Standard will be achieved by:

- Establishing the appropriate amount of artificial light needed for every room while maximising the use of natural daylight wherever possible
- Choosing energy efficient lighting lamps and fixtures
- Proper zoning and control system (motion sensor, etc) for common areas (carpark, lobbies, etc)

Internal wall colouring will be made as light as possible to maximise the use of natural daylight.

The developer will use fluorescent & compact fluorescent lighting for the proposed development. Wherever aesthetically possible and in locations which occupants might find acceptable, fluorescent, and in particular, compact fluorescent, lighting will be used.

The proposed lighting system consumes less energy than incandescent lighting. VIPAC also recommends the use of motion sensor devices for lighting in low-use areas. Please refer to VIPAC's BASIX and BCA Section J reports for further details.

1.1.5 Appliances

It should be ensured that any other appliances that are installed by the developer are as energy efficient as possible. Energy efficiency of appliances can be determined by their Energy Rating Label[1], which rates them between 1 and 6 stars, 6 being the highest.

The proposed apartments within the development will be provided with 3.5 Stars dishwashers, 2.5 Stars dryers and 3 Stars fridges (only to Buildings 1, 1B, 5, 6, 6A and 6B). Please refer to VIPAC's BASIX report for further details.

1.1.6 Atmosphere

Given the potential significant contribution that the proposed development make to the emission of greenhouse gases it is extremely important to ensure that the proposed development is environmentally conscious. This includes ensuring that it is thermally efficient so that excessive energy is not consumed when heating and cooling, ensuring minimal water consumption, ensuring recycling is maximised and waste is minimised. In addition to ensuring minimal impact on the environment, it is also important to ensure a high amenity for the internal and external spaces of the development. This includes ensuring adequate solar access is provided to internal and external spaces, wind conditions are not adversely affected and the indoor air quality is of a high standard. All of these measures will reduce the environmental impact of the building on the atmosphere.

Based on the Architectural Design Report:

- 68.4% of the apartments are cross ventilated
- 100% of kitchens are naturally ventilated

VIPAC recommends that:

- The developer should encourage avoidance of HCFC based refrigerants and Halon fire suppression systems
- For pest control, mechanical means should be employed rather than chemicals. The developer will ensure that the building is sealed, caulked and points of entry are protected by adequate mechanical means from insect and pest entry
- No asbestos products should be used on this project
- All painting to use water based or low off gassing paints, adhesives and varnishes to floors, walls and ceilings with zero-Volatile Organic Compounds (i.e. no VOC's added in the manufacturing process)

[1] http://www.energyrating.gov.au/

1.1.7 Solar Access and Shading

Within the constraints of the site the design form of the building seeks to take advantage of the site's solar access potential. For example:

- The proposed development is placed on its site so as to maximize solar access between 9am and 3pm in mid winter. The north wall will not be significantly shaded by other buildings or by vegetation in mid winter
- All spaces have a mix of north, west, south and east aspect windows with good solar access
- The west façades have glazing elements, thus there will be some mid to late afternoon solar rays coming in into the spaces
- Most of the spaces will receive direct solar access for much of the morning period year round
- Protrusions on some rooms will provide some shading to the glazing from higher altitude solar rays
- There are adjustable & fixed screenings on the glazing to most rooms that will provide shading and allow suitable control for solar access into the rooms

Based on the Architectural Design Report:

- 68.4% of the apartments are cross ventilated
- 80% of the apartments receive minimum 3 hours of sun to the living areas and private open spaces in mid winter between 9AM and 3PM
- Only 7.6% of the apartments are south facing single aspect apartments

1.2 WATER

1.2.1 Water Conservation

The measures within the development that conserves water and reduces external water demands, in particular the demands of the project on the city's domestic water supply are as follow:

- Rainwater tank will installed and the water captured will be used for landscape irrigations
- Installation of minimum 4 stars (WELS Rating) toilets for common areas and apartments
- Minimum 3-star (WELS Rating with flow rate of >6L/min but <= 7.5L/min) showerheads for apartments
- Minimum 3-star (WELS Rating with flow rate of >7.5L/min but <= 9L/min) showerheads for common areas
- Minimum 4-star (WELS Rating) taps for basins and kitchen sinks will be installed

1.3 BUILDING MATERIALS

1.3.1 Maximisation of use of renewable and/or recyclable materials and components

Complete energy efficient design aims to reduce the energy consumed by a building over its entire lifecycle from "cradle to grave". In addition to operational energy (energy consumed through heating and cooling a development) the energy consumed through creating the development, the toxicity and recyclability etc. of the materials selected should be considered. Construction materials and products should therefore be selected based on balancing criteria of:

- Recyclability
- Sustainable sourcing
- Low embodied energy
- Low pollution from manufacturing
- Low transport costs
- Minimal environmental impact
- Durability and minimal maintenance
- Non-hazardous, and
- Eco-labelling and certification.

Embodied energy is the 'up front' capital energy investment at the construction stage associated with the building materials and process used in the production of a building. This includes the mining or harvesting of raw materials, processing these materials into housing fabrics, transport for both raw materials and refined products and the preservation of the energy investment through durability.

The building is designed to be durable providing long term-use with the possibility of later adaptive re-use. Materials to be used extensively throughout the development include concrete, glass, aluminium (for all glazing frames), and carpet. VIPAC would recommend maximising the use of local materials for this project. This will reduce the transportation requirements for the materials used on the job, with corresponding embodied energy savings.

Table 1: Renewable/recyclable Properties for Some Common Building Materials

Material	Embodied Energy	Durability	Re-useability /Recyclability	Toxicity	Renewable	Polluting
Aluminium	Very high	High	High	Low	No	Moderate
Steel	High	High	High	Generally Low	No	Moderate
Concrete	Moderate	Moderate-high	High potential, depends on market	Low	No	Moderate-low
Wood	Low	Moderate	High	Low	Yes*	Low
Glass	Moderate	Moderate	High	Low	No	Low
Carpet	Moderate-high	Low	Moderate, although market very limited	Low	Partially	Moderate-low

*** Any timber used should be sourced from plantation timber**

In general, maximum use should be made of local materials for the project. This will reduce the transportation requirements for the materials used on the job, with corresponding energy savings.

VIPAC recommends using recycled materials and Forest Stewardship Council (FSC) approved plantation timbers. This includes timbers used for framing and general construction, concrete formwork, cladding, door frames, flooring, fencing, exposed decking, pergolas and stairs. VIPAC recommends that no rainforest timbers or timbers cut from old growth forests will be used. In regards of plantation timber, it is important to ensure that the timbers are from a well-managed source according to Forest Stewardship Council (FSC) principles.

1.3.2 Material Selection

In general, the proposed building makes good use of energy efficient materials. Proposed building materials are presented below:

External Walls	will be concrete and masonry
Roof	Concrete & Metal Deck.
Roof Colour	Medium colour (solar absorptance of 0.475 – 0.70).
Ceiling	will be plasterboard.
Floor Slabs	are concrete throughout, having a high thermal storage capacity.
Glazing	Clear *single* glazed with aluminium frame.
Internal Walls	internal division walls will be standard plasterboard and brick plastered.
External Colours	Generally a series of medium colours are planned for all non-glazed exterior walls.

Thus, the building in general will have the ability to stabilise changing thermal conditions and reduce diurnal (day-night) temperature changes if attention is paid to design details at the wall interfaces.

Internal Wall Colouring	will have a light colour.

Thermal mass is used to smooth out daily temperature variations. Generally the denser the material, the higher its thermal mass, and therefore the more heat energy it can store.

External walls of the proposed development will be concrete/masonry; internal walls will be plasterboard and the floor slabs will be concrete. Dense materials like concrete have reasonable thermal mass. They absorb heat from surroundings during the day then radiate it when the air temperature cools down, hence stabilising the inside temperature of the

proposed development by acting as a heat sink and source as well as providing a time lag in equalising internal and external temperatures.

For the shopping centre and serviced apartments, VIPAC also recommend minimum R2.4 External Wall insulation and minimum R2.8 Roof/Ceiling insulation to be installed to ensure compliance with BCA Section J.

All residential apartments comply with the BASIX Thermal Comfort section. Please refer to VIPAC's BASIX and BCA Section J reports for further details.

1.3.3 Glazing

The final choice of glazing system for the building should be addressed via mainly acoustic considerations to take into account the effect of traffic noise in the area. Clear single glazing has been proposed for the development. The selected glass should also fulfil acoustic requirement. There are balconies on the apartments, providing some shading to the façades from the higher altitude solar rays.

From an energy point of view, a careful balance must be achieved in relation to the choice of glazing systems between...

- Limiting the heat gain during summer,
- Allowing sufficient solar heat into each building during winter, and

While at the same time...

- When considering energy efficiency, a careful balance must be achieved in relation to the choice of glazing systems between allowing sufficient solar heat into the building during winter, and limiting the heat gain during summer. At the same time it should ensure reasonable visibility from all rooms and not adversely impact on the need to increase artificial lighting

Equally important however to the choice of glazing is the design detailing of the glazing interface to the window framing system and the provision of adequate sealing. Thus, the solar access efficiency of the apartments will depend markedly on the ability of enclosed areas to control heat gain and loss in winter by:

- Limiting the infiltration of cold air (inflow) during the day, and
- Limiting the airflow leakage (outflow) at night-time

VIPAC would recommend:

- A non-reflective glass with a visible light reflectivity co-efficient of less than 10% is used for any glazed surfaces

Please refer to VIPAC's BASIX and BCA Section J reports for further details on glazing commitments.

1.4 WASTE

1.4.1 Recycling Facility

The proposed development has garbage/recycling facilities with adequate access to the street to provided and available for pick up by local recycling services.

1.4.2 Construction Waste

The developer/builder should aim to reduce the amount of construction waste and conserve resources through reuse or recycling to reduce the environmental impact from material manufacturing and transport.

VIPAC noted that, based on the Construction Management Plan prepared by Crown:

- An on-site waste management plan will be developed
- A recycling plan will be developed for construction waste materials
- Sub-contractors will be encouraged to make use of recyclable packaging for any materials sent to site

1.5 TRANSPORT

The proposed development is located on the site with a good public transport access, especially on Gardeners Road. Currently there are bus stops near the site on Evans Avenue, Racecourse Place and Gardeners Road with regular bus services to and from the City:

- Routes 301 and 303
- Route 343
- Route 357

As the site is very close to public transports, they offer viable alternatives to travel by modes other than car. The proposed development will also include bicycle parking to encourage use of alternative modes of transport other than private vehicles.

2. CONCLUSIONS AND DRAFT STATEMENTS OF RECOMMENDATIONS

The following additional recommendations have been made to improve significantly the sustainability within the proposed development:

- Use of light colouring for the internal walls to maximise the use of natural daylight
- Minimum R2.4 External Wall insulation for the retail spaces and serviced apartments
- Minimum R2.8 Roof/Ceiling Insulation for the retail spaces and serviced apartments
- Use of Air-conditioning systems with high coefficient of performance

Recommendations regarding lighting, appliances, internal finishes and waste etc. have been made within the body of the report.

APPENDIX A – ARCHITECTURAL DRAWINGS

The building sustainability performance assessment carried out in this report was based on the following architectural drawings supplied by Rice Daubney Architects received on 26th June 2012.

Binder1-Residential.pdf
SK 217 RETAIL NLA SCHEDULE.PDF
SK225 GFA AREA SCHEDULE.PDF
DA 01 EXISTING SITE SURVEY PLAN.PDF
DA 02 SITE PLAN.PDF
DA 03 BASEMENT LEVEL 2 PLAN.PDF
DA 04 BASEMENT LEVEL 1 PLAN.PDF
DA 05 GROUND FLOOR PLAN.PDF
DA 06 LEVEL 1 PLAN.PDF
DA 07 LEVEL 2 PLAN.PDF
DA 08 LEVEL 3 PLAN.PDF
DA 09 LEVEL 4 PLAN.PDF
DA 10 LEVEL 5 PLAN.PDF
DA 11 LEVEL 6 PLAN.PDF
DA 12 LEVEL 7 PLAN.PDF
DA 13 LEVEL 8 PLAN.PDF
DA 14 ROOF PLAN.PDF
DA 15 BUILDING 1 & 1B LAYOUTS.PDF
DA 16 BUILDING 1A LAYOUTS.PDF
DA 17 BUILDING 2 & 3 LAYOUTS.PDF
DA 18 BUILDING 4 & 4A LAYOUTS.PDF
DA 19 BUILDING 5 LAYOUTS.PDF
DA 20 BUILDING 6 & 6A & 6B LAYOUTS.PDF
DA 21 BUILDING 7 LAYOUTS.PDF
DA 22 ELEVATIONS - SHEET 1 SOUTH SITE_ NORTH & WEST ELEVATIONS.PDF
DA 23 ELEVATIONS - SHEET 2 SOUTH SITE_ SOUTH & EAST ELEVATIONS.PDF
DA 24 ELEVATIONS - SHEET 3 NORTH SITE_ EAST & SOUTH ELEVATIONS.PDF
DA 25 ELEVATIONS - SHEET 4 NORTH SITE_ NORTH & WEST ELEVATIONS.PDF
DA 26 SECTIONS.PDF
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