



GEORGE FLOTH PTY. LIMITED
CONSULTING ENGINEERS

**WELLES THOMAS PLAZA
THOMAS STREET & ALBERT AVE
CHATSWOOD**

Report On

**ENVIRONMENTALLY SUSTAINABLE
DEVELOPMENT**

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1.0 INTRODUCTION

The following report addresses the environmentally sustainable development aspects of the building and its services proposed for the mixed development bounded by Thomas Street, Albert Lane and Albert Avenue in Chatswood and incorporates titled land on Thomas Street Lot A DP 381223, Lot B DP 381223, Lot 13 DP 2983 and on Albert Street DP2983 for Lots 23 to 30.

The proposed development incorporates a significant number of initiatives in the sustainable design area:

- The residential component of the building shall be designed to comply with the Building Code of Australia BASIX requirements.
- The retail component external facade shall be designed to comply with deemed to satisfy provisions of Section J of the Building Code of Australia.
- A 5 star NABERS rating is targeted for the commercial area of the west tower. A list of passive and active initiatives to be included in the design to achieve the 5 star target are listed in Appendix A.
- The building construction shall include materials that have excellent thermal properties to ensure that the air conditioning plant capacity energy consumption is minimised.
- Intelligent design and material selection will ensure that thermal comfort is not achieved entirely by a mechanical means. Passive design initiatives such as performance glazing, shading and insulation will reduce demand on the mechanical air conditioning systems which will reduce energy consumption and greenhouse gas emissions.

1.1 Building Description

The proposed development comprises twin towers over 25 metres in height, with 5 basement carparking levels, an active ground floor comprising external areas, retail spaces, food premises, and building lobbies.

The west tower comprises 19 storeys of commercial office space and the east tower comprises 25 storeys of residential apartments.

The building project that this plan has been prepared for is the construction of a mixed development consisting of the following:

Activity	Level
East Tower Retail	Ground Level and Level 1
East Tower Residential Manager	Level 3
East Tower Residential Common Area	Level 3
East Tower Residential	Levels 3 - 28
West Tower Retail	Ground Level
West Tower Office	Levels 1 - 21
Common Carpark	Basement 1 – Basement 5

2.0 ESD INITIATIVES

The ESD initiatives have been categorised under the following headings:

- Atmosphere
- Energy / Greenhouse Gas Abatement
- Indoor environmental quality and thermal comfort
- Biodiversity
- Building Materials
- Waste
- Water conservation
- Noise
- Management

2.1 Atmosphere

The ESD initiatives in “Atmosphere” include:

- Residential apartments are designed for compliance with BCA for natural ventilation.
- Refrigerant ODP – Air conditioning units proposed will use refrigerant R410A (mainly in packaged units) and other refrigerants with zero (0) ozone depletion potential.
- Insulant ODP – Insulation will be specified and selected where no ozone depletion substances are used in the manufacture of insulating materials.
- Provision of refrigerant leak detection system for major chiller plant in the commercial building to minimise ODP and GWP emissions.
- Minimising light pollution by appropriate design of external lighting requirements.
- Cyclist facilities – Secure bike racks are available in Basement 1.

2.2 Energy / Greenhouse Gas Abatement

The ESD initiatives in “Energy / Greenhouse gas Abatement” include:

- BASIX Certificate – The residential tower will comply with BASIX energy requirements by reducing energy use by at least 20%.
- Provision of energy efficient appliances eg dishwasher, clothes washer and dryer in the apartments to improve the Basix energy score.
- Residential air conditioning will be reverse cycle water cooled package units providing energy efficient heating and cooling to the apartments.
- Solar access or cross ventilation for clothes drying – Solar access will be assessed and allowed for where available for clothes drying. This will reduced the energy used by clothes dryers substantially, and thus, reduce the greenhouse gas emissions from providing the energy.
- Retail glazing to comply with deemed to satisfy requirements of BCA section J.
- NABERS Energy The office building will be designed to achieve 5 stars NABERS Energy rating for list of initiatives see Appendix A.
- Installation of energy efficient lighting and fixtures.

- The car park ventilation system design will be based on an engineered solution to minimise the volume of supply and exhaust air required. The reduced air flow allows the fan size and motors to be reduced providing significant energy savings. CO monitors will be installed in the carpark and interlocked with the ventilation system to keep fan operation speeds and operation times to a minimum saving energy.
- Energy consumption levels will also be achieved by compliance with BCA Section J “Energy Efficiency” requirements.

2.3 Indoor environmental quality and thermal comfort

Indoor environmental quality and thermal comfort initiatives proposed for the development include the following:

- Daylighting – Daylighting is proposed for at least 60% of the net usable commercial area. Daylighting provides the occupants with a sense of connection to the outside world and also saves on lighting energy used.
- Artificial lighting will be designed to comply with the requirements of BCA Section J6 and lighting loads will not exceed the following:

– Commercial Office	6 W/m ²
– Retail Areas	20 W/m ²
– Circulation Space & Corridors	8 W/m ²
– Entry Lobby	15 W/m ²
– Carpark	3 W/m ²
– Carpark Entry	25 W/m ²
- Lighting to residential apartments will be fluorescent type light fixtures in accordance with the BASIX report.
- High frequency electronic ballasts – The use of high frequency electronic ballasts in commercial areas reduce the unfavourable symptoms to which some people suffer (eg eyestrain and headaches).
- Exhaust for high volume copiers and printers – Provisional exhaust risers will be provided in the office tower for tenancy fitouts. A tenant exhaust riser can assist in removing pollutants from the office environment, such as Volatile Organic Compounds (VOC's), ozone, nitrogen oxide gas, carbon monoxide and particulates.
- Supplementary outside air – Provisional outside air supply riser will be provided in the office tower for tenancy fitouts.
- BASIX Thermal Comfort – The residential units will be designed to comply with the BASIX Thermal Comfort requirements. This will result in less energy required in the use of heating and cooling of the residential apartments.

2.4 Biodiversity

The proposed ESD initiatives for Biodiversity include:

- 70% locally indigenous plant species – Landscape design of the development will have at least 70% locally indigenous plant species. This will reduce the impact of the building development on the local environment ecology and enhance the development through the re-introduction of indigenous species.

2.5 Building Materials

The proposed ESD initiatives for building materials include:

- Low VOC interiors paints – Internal paint with zero or low Volatile Organic Compounds will be specified.
- Low VOC flooring – flooring with zero or low Volatile Organic Compounds will be specified.
- Low Formaldehyde - All composite wood products specified to be of the low formaldehyde type.

The health effects of VOC and formaldehyde exposure are consistent with “sick building syndrome” effects. Eliminating or controlling sources of VOC’s and formaldehyde will have a positive effect on the well-being of the building occupants.

2.6 Waste

The proposed ESD initiatives for reduction of material waste include:

- Minimum 60% recycling of construction waste – Construction waste will be recycled for reuse.
- The volume of concrete used in construction is reduced by the use of oversized aggregate and or aggregate is replaced with industrial waste product.
- Steel reinforcing used in concrete and steel beams will contain ≥50% post consumer recycled product.
- Basement storage areas for recycling waste.
- Waste cupboard or storage area for recycling garbage on every residential floor.

2.7 Water conservation

The ESD initiatives in water conservation include:

- BASIX Certificate – The residential tower will be compliant with BASIX Water requirements to achieve 40% saving in potable water use.
- Residential, Commercial and Retail tapware and fixtures will provide the following ratings:
 - 4 star Wels rated low flush volume water closets
 - 6 star Wels rated flow restricted bathroom tapware
 - 5 star Wels rated flow restricted laundry and kitchen tapware
 - 4 star Wels rated flow restricted showers
- Water efficient appliances in the apartments eg dishwasher and clothes washer to improve the Basix water saving score.
- Drip Feed Irrigation – The landscaped area will have drip feed irrigation with timed switching.
- Rainwater Tank for basement and common area toilet flushing, filling of pool water and landscape irrigation.

- Collection of air conditioning condensate from commercial air conditioning for recycling purposes.
- Provision of a chlorine elimination system for the pool and spa backwash facility to enable recycling for landscape irrigation purposes.
- Fire systems will be designed to save water during test mode. Test water from the system will drain into a tank for reuse for basement and common area toilet flushing, filling of pool water and landscape irrigation.
- Water meters will be installed for all major water uses in both buildings. The meters will be connected to a Building Management System for monitoring to provide a leak detection system.

2.8 Noise

The ESD initiatives for Noise reduction include:

- Selection and location of equipment plant – Mechanical plant will be selected, acoustically treated and located in plant rooms and areas less sensitive to noise.
- The external and internal wall materials will be selected and constructed to comply with AS2107

2.9 Management

The ESD initiatives in Management include:

- Owners Corporation Manual – An owners corporation manual will be provided prior to occupation. The Manual will describe ESD initiatives proposed for the development including energy saving measures, water saving measures, waste management, etc.

3.0 CONCLUSIONS

Within the constraints of the site, the proposal makes considerable effort to conserve energy consumption and improve the environmental and ecological value of the site.

From the assessment the project has clear objectives to achieve and maintain environmental sustainability through compliance with BCA, target 5 star NABERS rating, inclusion of passive building design features, energy efficiency initiatives for services and management and construction methods to minimise waste.

APPENDIX A – NABERS RATING

The following is a list of proposed energy saving initiatives for the **commercial building** office areas to achieve a 5 Star NABERS energy rating:

Passive Energy Conservation Features to be implemented include:-

Architectural

1. High performance façade systems incorporating tinted double glazing with external shading designed to minimise solar heat gains in summer and minimise solar heating required during winter for the commercial building.
2. Insulated walls, roofs and terraces over occupied areas to minimise heat gains for both buildings.
3. Minimization of east / west glazing orientation to minimise heat gains.
4. The façade system and shallow floor plate provides excellent penetration of daylight.
5. Provision for installation of adjustable blinds / louvres for control of glare and solar heat gain.

Active Energy Conservation Measures for reduction in Greenhouse Gas Emissions include:

Mechanical Services

1. High efficiency chillers with a minimum full load efficiency of <0.18 kW/kW.
2. Two chillers of 50% capacity are used to allow the chillers to operate at an efficient band during medium and low cooling load periods and provide reliable after hours operation during low loads and low load chiller.
3. Chilled water storage tank to minimise chiller operation during low load requirements
4. Variable speed chilled water pumps controlled so that they always operate at the minimum possible speed to satisfy the load.
5. Integration of a heat recovery system on the air conditioning condenser water system to reduce the heat rejection required by the cooling towers by up to 20%, therefore also reducing the water consumption.
6. Integration of CO₂ monitoring systems into the air conditioning systems to maintain minimum outside air requirements and minimise energy use on heating and cooling outside air.
7. Optimum start / stop of chillers and boilers to minimize plant operation.
8. Variable speed fans controlled so that they always operate at the minimum possible speed to satisfy the load.
9. Variable air volume air conditioning system which matches the air supply to the actual and not the peak load.
10. Separate air handling units for each façade and the interior zone to eliminate re-heat and maximize economy cycle operation.
11. Night purge cycle to reduce the AC load on morning start up.
12. Carpark ventilation systems are designed to an Engineered Solution there by reducing air quantities and required fan and motor sizes

13. Variable speed car park ventilation fans are controlled by CO sensors so fans operate at a minimum speed to provide removal of air contaminants.
14. Variable speed fan is provided for the tenants' fresh air system and only operate on demand.
15. Variable speed pumps are provided for the tenants' condenser water system and only operate on demand.
16. Major fans have operating efficiencies greater than 69%.
17. High efficiency motors are used throughout.
18. Low duct velocities are employed to reduce fan energy.
19. A Building Management System (BMS) is incorporated to optimize building control and to meter major energy, gas and water usage to pinpoint areas of unexpected consumption.

Electrical Services

1. Provision of high efficiency office lighting systems with less than 6 W/m² lighting power density and provide illumination and glare control better than Australian Standard requirements.
2. Provision of separately switched perimeter office lighting zone for maximizing use of daylight. The lighting design will take into consideration natural light levels and have artificial lighting adjacent windows separately switched from artificial lighting not adjacent to windows.
3. Artificial lighting will be controlled by a time switch and motion detectors to ensure lights are not left on when not required.
4. Energy efficient T5 fluorescent lamps used for the office lighting.
5. Amenities lighting on office floors are activated by movement sensors in the access corridors and toilet areas.
6. Lighting in car parks is operated by movement sensors.
7. Office lighting is individually switched in zones less than 100m².
8. Power factor correction plant is provided. This reduces the electrical kVa demand.
9. All loads greater than 100kVa are provided with private intelligent energy meters connected to the Building Automation System for monitoring.
10. Provision of additional electricity metering facilities for encouragement of active energy management by tenants.

Hydraulic Services

1. Energy efficient gas fired hot water heaters serving residential apartments.
2. Hot water circulating pumps with timed control to cease operation out of building use hours
3. Energy efficient potable cold water pumps which consist of a triple pump set with variable speed motors.
4. Metering of gas systems to ensure gas usage is within acceptable base line usage. Areas metered are the whole building, inlet to hot water plant and mechanical services boiler
5. All motors to be high efficient type.

Lifts Services

1. High efficiency drives with a power factor greater than 0.9.
2. Sophisticated control system to optimize the movement of the lifts.
3. Re-generative electrical control which reduces energy usage.