SCIENTISTS
ENGINEERS
MANAGERS &
FACILITATORS

PROPOSED WOLLONGONG PRIVATE HOSPITAL

360-364 CROWN STREET (PACIFIC HIGHWAY) WOLLONGONG, NSW

ESD REPORT

March 2010
Revision 0

Project No: 3564.001

REPORT ISSUE AUTHORISATION

PROJECT: Proposed Wollongong Private Hospital
ESD Report

PROJECT NO: 3564.001

AUTHOR: Anna Filak
Blake Thompson

Date	Purpose of Issue/Nature of Revision	Rev	Reviewed by	Issue Authorised by
15/4/2010	Submission Issue	0	BT/AF	BT/AF

SEMF Pty. Ltd
Level 3, 50 Berry Street,
North Sydney New South Wales 2060 Australia
ACN 117 492 814 ABN 24 117 492 814

Telephone: (61 2) 9957 1112
Facsimile: (61 2) 9957 4815
Email: sydney@semf.com.au

CONTENTS

1. INTRODUCTION

This document presents Ecologically Sustainable Development (ESD) measures proposed for the new proposed healthcare development located at 360-364 Crown Street, Wollongong, NSW.

The proposed development is known as “Wollongong Private Hospital” and is to be reviewed under the Environmental Planning and Assessment Act 1979. The Project Application Number is MP 07_0070.

The Department of Planning has issued Director-General’s Requirements under Section 75F of the above act which requests demonstration of ESD measures to be applied in the project.

The current conceptual stage of the architectural design does not incorporate any construction details as yet, however the site configuration and development controls incorporate appropriate flexibility to allow for design development to proceed in accordance with ESD principles whilst meeting regulatory requirements.

This report describes the key features of the ESD strategy for the purposes of the Project Application submission.

2. DESCRIPTION

2.1 Project Description

The building is an 11 Level development including 3 underground car parking levels having a gross upper floor area of 19,095 square metres excluding plant areas.
The layout drawings indicate the following:

- Basement levels (3) with car parking and service facilities.
- Ground Floor main entry, Facilities Management, Retail spaces. Kitchen facilities and GP Centre.
- Level 1 Administration, Records, Staff Facilities and GP centre.
- Level 2, Consulting Rooms.
- Level 3, Angiography Unit, Oncology, Nuclear Medicine, University & Teaching Centre.
- Level 4, Operating Theatres, ICU.
- Level 5, Birthing Facilities
- Level 6, Inpatient Medical/Surgical Wards.
- Level 7, Inpatient Medical/Surgical Wards.
- Roof Level, Plant Room.

A full indication of area function and size is shown on the Murphys Architecture DA issue drawings.

2.2 Site and Climatic Conditions

Wollongong is in Climate Zone 5 in accordance with BCA Table A1.1, Climate Zones for Thermal Design. This zoning reflects the coastal climatic conditions of the area.

The site is elevated and with the proposed arrangements, prevailing winds will be incident on the building allowing for use of mixed-mode type ventilation arrangements to be utilized for suitable areas as conditions permit.

3. SUSTAINABILITY BACKGROUND

3.1 General

The development has been considered in this report as providing for appropriate triple bottom line ESD outcomes for the building covering social, environmental and economic aspects.

The base criteria for ESD for the project is meeting the general requirements, expectations and recommendations of the NSW Health Engineering Services and Sustainable Development Guidelines, Technical Series TS11.

This document specifically nominates sustainable development objectives as follows:

- Comfortable and healthy indoor environment.
- Minimised non-renewable resource consumption and environmental impacts.
- Cost effectiveness over its whole life cycle.

As part of the design process all of the above aspects will be considered together with those that provide appropriate returns for a commercial enterprise which may be assessed on both a return on investment and an overall building quality and therefore investment value and status in the industry and the community.

3.2 Benchmarking

Section J, Energy Efficiency, of the BCA sets out minimum performance requirements that the building must achieve in relation to fabric and energy usage.

For an overall building appraisal that incorporates other sustainability factors including site impact, transport, construction waste and the like, to give an overall assessment of the buildings environmental footprint, then use of a tool such as the Green Building Council Australia, Green Star Healthcare V1, rating is appropriate.

Section 9 of this report includes a pre-assessment matrix for Green Star which indicates that a four star rating is achievable with the current design parameters.

The Green Star rating tool includes a greenhouse gas emissions calculator which refers to reference performance data in BCA issues prior to 2009.

Additional to this assessment, rating to NABERS Health for energy consumption benchmarking is possible for the building, this being a comparatively new tool recently issued after a trial period.

3.3 Key Design Issues

The following are considered key design issues for the complex:

- Passive features to minimise installed equipment size and extent of services.
- Façade treatment including glazing types and solar control.
- Facilities that minimise consumption of energy and allow for the reuse of site collected water.
- Services installations that allow for waste heat reclaim and otherwise energy efficient operation in line with best practice with commercially available equipment.
- Maintainability of building fabric and serviceability of equipment.
- Provision of safe operating environments.
- Provision of occupant comfort and satisfaction with the occupied spaces.

4. THERMAL MASSING & BUILDING FABRIC

4.1 Orientation of Building

The building is sited on the land to maximise functionality in line with providing efficient pedestrian and vehicular access and good access to natural light, prevailing winds and area views.

4.2 Solar Access & Glazing

All levels have potential direct access to daylight from glazing from all façade orientations. The north façade areas on Levels Ground, 3 and 4 have generally been allocated to spaces which do not require substantial glazing for function or are not air conditioned, such as corridors, services areas and storage, and reduce building cooling loads on this basis.

High performance glazing is proposed generally to suit façade exposures, using low emittance double glazing panels.

Internal shading will also be provided to eliminate any occupant discomfort from glare or direct solar effects.

Glazing systems will exceed the requirements of BCA Section J.

4.3 Building Form & Construction

The building will be of concrete frame construction with masonry infill.

The roof will be of concrete with insulation applied on top below the main waterproofing membrane.

The main internal division walls in Ward and Procedures areas are proposed in masonry. Lightweight construction will be used in other areas for partitions with appropriate mass and insulation treatment for thermal, fire, smoke and acoustic separation.

4.4 Thermal Mass Assessment

The proposed building fabric and internal walls on floors where 24 hour or extended operational hours will occur, results in a nett high building mass with consequential benefits

in thermal storage and inertia. This allows for good control of space conditions as load variation cycles are smoothed by the storage inherent in the structure.

The potential for effective utilisation of free cooling effects from use of outside air cycles and night purge type functions is also substantially enhanced by the mass of the structure on a similar basis.

5. WATER SENSITIVE URBAN DESIGN MEASURES

5.1 General

A design goal for the development is to minimise usage of water generally so that site discharges are also minimised, and to collect and reuse roof rain water to minimise mains water usage.

5.2. Metering

All separate sections of the building and high usage plant and equipment will have individual water meters installed to allow for a usage monitoring and reporting regime to be put in place. This will provide performance parameters on usage and allow for attention when excessive usage becomes apparent and alarms on system or equipment malfunction.

5.3. Fixtures and Fittings

Fixtures and fittings will be selected to provide the best Water Efficiency Labelling and Standards (WELS) rating commensurate with the function of the area.

- WC's will have a 3 Star Rating
- Basin taps generally will have a 5 Star Rating (Some areas associated with procedures will have higher flow fittings)
- Shower heads will have a 3 Star Rating (Maximum available)
- Food preparation/serving areas will have a 3 Star Rating

5.4. Efficient Water Use Equipment

Specific equipment using water directly will have water usage considered as part of the selection criteria, including any medical equipment.

Cooling towers, being large water consumers, are not proposed for this project. However to maintain the system efficiencies available, the use of adiabatic type coolers for heat rejection for cooling equipment is proposed, utilizing recycled water from roof collection as available. This type of equipment has the added benefit of reducing legionella risks in the building.

5.5. Recycling

Collection of roof stormwater is proposed with this water stored, treated and reused for toilet flushing, landscape irrigation and in mechanical heat rejection equipment serving main cooling plant.

Preliminary appraisal of likely system sizing to suit the development indicate that a tank in the order of 120,000 litres would be appropriate, subject to detailed design assessment.

6. ENERGY EFFICIENCY

6.1 General

The building with its systems is intended to be built and to operate using minimal energy and therefore with minimum impact on the environment.

All installations in the development are to be considered on the basis of this premise.

6.2 Mechanical Services

6.2.1 Cooling and Heating Systems

At this stage of the design development, it is considered that a chilled water cooling system provides the best facility for control of temperatures within the various spaces and also provides the basis for appropriate control of space humidity in critical areas.

The tri-generation plant proposed (Refer 6.3.1) can provide domestic hot water and heating hot water for the facility with inclusion of appropriate storage, and cooling from an associated absorption type chiller set using waste heat as an energy source.

For peak cooling additional high efficiency chiller sets, similar to those using friction free magnetic bearings are proposed.

As stated previously, adiabatic type closed circuit coolers would be used for heat rejection from cooling plant, utilising collected and stored roof stormwater to provide the evaporative cooling effect. Such plant has the advantage or providing the efficiencies available in heat rejection by evaporating water whilst minimising water usage compared to more conventional cooling towers.

A heating hot water system is proposed with the available heat from the tri-generation plant supplemented by high efficiency condensing type gas fired boilers. These boilers typically have thermal effiencies 10% better than conventional non condensing boilers.

All piping reticulation and equipment will be correctly insulated to minimise system losses.

6.2.2 Air Handling & Distribution

Air handling equipment will be dedicated to individual thermal zones and will incorporate variable speed drives for variable air volume systems wherever appropriate and outside air economy cycles on larger units.

For areas such as operating suites, where 100% outside air is required, heat reclaim using run-around coils connecting the supply and exhaust air streams is proposed.

6.2.3 Ventilation

Provision to allow for opening windows in specific areas will be made. At this stage some ward areas are appropriate together with consulting suites and teaching facilities.

To allow for appropriate cross flow ventilation, corridor facilities will be required for relief or inlet air flow.

Specific service areas will be exhaust ventilated to meet their functional requirements.

Cooking areas will be provided with high efficiency collection hoods to minimise exhaust airflows and consequential make up requirements. Make up air facilities local to the hood extraction points is proposed to minimise any conditioning requirements in the general kitchen area.

6.2.4 Controls

Full Direct Digital Controls for all Mechanical Services will be installed connected to a Building Monitoring System.

Apart from control of day to day mechanical functions to meet building design parameters the system will provide energy efficiency functions such as outside air control, night set back, night purge and area usage monitoring for both energy and water.

6.3 Electrical Services

6.3.1 Power

An authorities substation will provide power to the site in line with normal practice

Power factor correction will be provided on the main supply system to improve efficiency.

To meet energy performance objectives, the use of a small tri generation plant is proposed. This equipment would provide base power load for the 24 hour sections of the building, principally being the inpatient ward areas and associated infrastructure. Waste heat from the equipment would be used for domestic water and space heating and for cooling when required.

Minimisation of energy usage from general equipment will form part of the selection process at procurement and subsequent management regimes.

6.3.2 Lighting

All lighting will be selected to minimise consumption and associated heat loads on air conditioning systems.

Extensive use of LED light fittings is proposed and where larger fluorescent fittings are required these will be of the T5 lamp with electronic ballast type.

An automatic control system will provide switching on motion detectors and level sensors at building perimeters to minimise energy usage.

6.4 Domestic Hot Water

It is considered that the tri-generation plant will provide the bulk of the hot water requirements for the complex, on the basis of 24 hour operation of that equipment and inclusion of appropriate water storage.

Back up facilities, by means of solar assisted gas fired hot water heaters is proposed.

7. RECYCLING AND WASTE DISPOSAL

7.1 General

Wastes are inevitably generated from large scale public buildings such as hospitals. These waste streams can, however, be managed to good effect through adherence to best practice.

State and Commonwealth legislation dictates that management of these waste streams must be carried out in accordance with the Waste Hierarchy. The Waste Hierarchy lists the most to least desirable outcomes for waste management with actual disposal as the least favourable option. See Fig. 1 below. One of the major imperatives of sustainable design is to use the waste hierarchy of avoid, reduce, reuse and recycle

Figure 1 – Waste Hierarchy based on Resource NSW data.

As well as compliance with government legislation such as the NSW Government's Waste Reduction and Purchasing Policy (WRAPP) and local government policy, there are other drivers and incentives for good waste management.

These include working in alliance with local council waste collection services, their requirements and private contractors and participation in schemes such as Green Star. The system covers a number of categories that assess the environmental impact that is a direct consequence of a projects site selection, design, construction and maintenance. Green Star points are awarded for the preparation of a comprehensive waste and recycling management plan for a reduction in the amount of a facilities overall operational waste and demonstrating that up to 80% of construction waste by weight is re-used or recycled.

Refer to section 9 of this report for a Preliminary Green Star Assessment Matrix.

7.2 Design and Construction Phase

Waste management is not limited to the operational phase of a buildings life. Waste management of a building is applied across both the operational and Construction/Demolition phases of a buildings life. According to the Australian Government, Department of Environment and Water Resources - *ESD Design – Office and Public Buildings, 3rd Edition May 2007,* Waste is a major environmental issue in the built environment with more than 40% of landfill resulting from building-related waste. Construction and demolition waste alone makes up 33% of the landfill space in Australia. This can be reduced in many cases by 80-90% through better waste management procedures.

During the planning phase building materials with a high level of recycled content, low water and energy production costs will be selected. These materials will also have low toxic emissions to maintain internal environments for the health of all occupants.

Many of the wastes generated during the construction and demolition phase of the buildings life will be recyclable materials such as steel, glass, paper, cardboard, concrete and brick. When properly managed and appropriately separated and distributed to the correct facility nearly all materials are completely recyclable.

Methods proposed for waste reduction include:

- Waste management awareness,
- Sorting of materials,

- Organised collection and recycling,
- Implementation of purchasing policies to minimise waste generation,
- Use of standard sizes and prefabricated components for construction and
- Maintaining records and conducting audits of wastes in order to meet set target levels.

The *ESD Design – Office and Public Buildings, 3rd Edition May 2007* advises to Encourage contractors to have a plan of what waste they expect to be generated by the project, how they will divert it from landfill, and where it will be sent for reuse or recycling.

Ensuring that the contractor has an ISO 14001 certification is one way of ensuring that the contractor has at least a basic understanding of waste minimisation requirements. This certification is for all environmental impacts, not just waste. It provides assurance that the contractor understands how to carry out an environmental plan and its associated waste management plan.

7.3 Operational Phase

Waste minimisation during the operation of the hospital will rely upon building management and a waste management plan specific to the building and its services will be provided. Opportunities for waste minimisation will be determined at the start of the life of the building by implementing a waste and recycling reporting, auditing and management programme as part of the everyday management of the building. Waste management awareness and occupational education will be specifically targeted.

Provision of waste sorting and segregation facilities as well as the setting and adherence to waste reduction targets is crucial. The behaviour of staff, patients and contractors can be influenced for the better by ensuring easy access to recycling facilities, describing what happens to the recycling and waste streams from the building and including reports to all involved on performance.

It is also particularly important that the management program measures the actual waste leaving the building and where it is taken – recycling, landfill, composting as this allows for active management of the waste streams.

7.4 Provision of Sorting Facilities

Appropriate waste sorting and segregation facilities will be included based on the type and amount of waste to be generated. These facilities will also address all applicable legislative requirements and take into account the collection services available.

For the design, construction and operation of waste storage and process areas a number of factors will be considered. As follow:

- Waste and recycling streams should be segregated within the building,
- Facilities for separated waste should be indicated on all plans,
- Signage,
- Easy and amenable access should be provided to waste material collection and storage areas,
- Storage areas should be of sufficient capacity to accommodate expected waste quantities and frequency of collection and easily accessible by removal vehicles, and provided with appropriate environmental controls.
- All prescribed monitoring and reporting requirements should be undertaken.

7.5 Recycling Schemes

As mentioned above and outlined in Fig. 1 the most desirable means for managing waste is avoidance, followed by reduction and reuse. Management schemes, awareness and education plans to this end are the most preferred option for this project for dealing with wastes before their creation. Inevitably though, some waste material will be produced from any large scale building.

The following table outlines potential waste streams generated from the operational phase of a large building such as this hospital and the possible recycling options for these streams.

Table 1: Hospital Waste Streams and Management Options

Hospital Facility	Waste Description	Waste Stream	Waste Management Option
Administration and Kitchen	Paper, Cardboard	Solid Inert	Recycle through council provided kerbside collection
	Plastic, cans, glass		Recycle plastic containers 1-7, glasses, cans in council provided kerbside collection glass recycling bins
	Copier and printer cartridges		Recycle used cartridges by collection or drop off at facility
	Polystyrene from packaging boxes		Recycled through a polystyrene collector
	Commercial Garbage wastes Food wastes- vegetable kitchen wastes	Putrescible	Place in council provided kerbside garbage bins or, Compost on site
	Garden clippings, grass cuttings		Place in council provided kerbside garbage bins or, Compost on site
	Grease trap effluent	Prescribed Industrial Waste	Discharge to licensed trade waste and/or contractor collection
	Vegetable, fruit, food processing effluent		Discharge to licensed trade waste
	Animal and vegetable oils		Collected through licensed oil collector
	Animal effluent and residues from poultry, meat and fish processing		Discharge to licensed trade waste
General Maintenance Waste	Vehicle, machinery and industrial wash waters with or without detergents		Discharge to licensed trade waste and/or contractor collection
	Inks, dyes, pigments, paints, lacquers and varnish		Recycle through participating collection centres or transfer stations
	Pesticides, herbicides		Dispose through appropriate chemical collector
	Batteries, scrap metal and electrical equipment		Recycle through collection service or dispose of at transfer station
	Fluorescent lamps including high efficiency		Recycle through local council or appropriate DECCW scheme
	LPG cylinders, gas Cylinders and fire extinguishers		To be collected by cylinder distributor or appropriate hazardous waste/dangerous goods collector
Medical and Clinical Related Waste	Sharps (eg. Needles, scalpel blades)		Stored in Australian Standard Sharps container and removed by licensed waste collector or licensed medical waste collection scheme
	Biomedical wastes (body tissues, fluids), Clinical waste		Stored in appropriate containers for infectious waste and cytotoxic waste and to be removed by licensed waste collector or medical waste collection scheme
	Pharmaceuticals and chemical substances		Removed by licensed waste collector or medical waste collection scheme
	Low level solid radioactive waste		To be contained in appropriate bags and disposed of to landfill through licensed waste collector

8. OTHER ESD ISSUES

Other ESD issues that may be considered for the development could include land usage, materials used in construction, occupant comfort and site access together with proximity to public transport facilities.

These items are effectively considered as part of the Green Star rating assessment process which is included as Section 9 of this report.

9. GREEN STAR PRE-ASSESSMENT MATRIX

A Green Star Preliminary Assessment Matrix for the project follows.