SEARS
ESD REPORT
North Shore Private Hospital East Wing

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1 INTRODUCTION

This document presents Ecologically Sustainable Development (ESD) measures proposed for the new proposed healthcare development located at North Shore Private hospital 12 Frederick Street, St Leonard's, NSW.

The proposed development is known as "North Shore Private Hospital East Wing" and is to be reviewed under the Environmental Planning and Assessment Act 1979. The Project Application Number is SSD 7543.

The Department of Planning has issued Secretary Environmental Assessment Requirements of the above Act which requests demonstration of ESD measures to be applied in the project.

The current conceptual stage of the design does not incorporate any construction details as yet, however the preliminary services design, 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 proposed for this building

2 DESCRIPTION

2.1 Project

The building is a10 Level development including 2 car parking levels having one of which is below ground with a gross upper floor area of **18,169** square metres excluding plant areas.

The layout drawings indicate the following:

- Lower Ground floor 3 with car parking and service facilities.
- Lower ground floor 2 with car parking, loading dock, medical records and service facilities.
- Lower ground floor 1 with car parking ramps, and service facilities.
- Ground Floor main entry, client drop off, medical imaging. Consulting space, Retail spaces, and ambulance bay.
- Level 1 Medical consulting, staff and Day procedure Centre.
- Level 2, inpatient unit.
- Level 3, inpatient unit.
- Level 4, inpatient unit.
- Level 5, inpatient unit
- Roof Level, Plant Room.

Full details of the floor layouts are shown on the HPI DA issue drawings.

2.2 Site and climatic conditions

The site is located at St Leonard's NSW in Climate Zone 5 in accordance with BCA Table A1.1, Climate Zones for Thermal Design.

The site is elevated behind the Kolling building and beside the NSPH car park. The site is windy due to the existing buildings and the sitting of the new facility on the hill allowing

for use of mixed-mode type ventilation arrangements where practical.

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.

3 SUSTAINABILITY

3.1 General

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.

This document specifically nominates sustainable development objectives as follows:

- Comfortable and healthy indoor environment.
- Minimization of non-renewable resource consumption and environmental impacts.
- Cost effective whole of 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 (20% IRR) and assessed on both return on investment and 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.

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.

The NSW Health Guidelines set a criteria of 10% greater efficiency than the Deem to Satisfied DTS requirements of the National Building Code Section J

This building is currently designed to meet this requirement.

3.3 Key Design Issues

The following are considered key design issues for the facility:

- Passive features to minimize installed equipment size and extent of services.
- Façade treatment including glazing types and solar control.
- Facilities that minimize 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

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

4.2 Solar Access & Glazing

All levels have direct access to daylight from glazing on all façade orientations. The IPU façade areas on Levels 2, 3, 4 and 5 have been allocated to spaces with direct access to the facade glazing. Levels ground, and first floor day procedures do not require substantial glazing for function are located in the core areas of the building.

The consulting and retail suite on ground floor and level 1 are located adjacent the main east and southern facades to provide access to day light.

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

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 net 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.

Internal concrete load bearing walls have been considered to meet the above requirements.

The potential for effective utilization 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 minimize usage of water generally so that site discharges are also minimized, and to collect and reuse roof rain water to minimize 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, to minimize water consumption side stream filtrations is proposed for this project.

5.5 Recycling

Collection of roof storm water 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 50,000 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 gas fired plant proposed for the heating hot water for the facility with inclusion of appropriate storage, and condensing high efficient heaters.

Cooling is proposed to utilize high efficiency water cooled chiller sets, similar to those using variable magnetic bearings chillers and connected to roof mounted cooling towers. This proposal increases the COP for the chiller to 5.5 and an IPLV of 9.5

A heating hot water system is proposed with high efficiency condensing type gas fired heaters. These heaters are typically are 10% more efficient than conventional heaters and 10% higher that the minimum requirements in the NCC section J .

All piping reticulation and equipment will be correctly insulated to minimize 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.

6.2.3 Insulation

Ductwork and pipework will be insulated to a minimum level required by NCC section J.

6.2.4 Ventilation

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

Ward ensuite will be ventilated to 200% of the minimum requirements of AS 1668.2 to provide acceptable ventilation to remove water vapour .

Heat recovery will be considered to recover energy from the exhaust air and transfer to the outside air.

6.2.5 Controls

A Full Direct Digital Controls for all Mechanical Services will be installed forming a Building Monitoring and Control System (BMCS).

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 authority's 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.

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

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

6.3.2 Lighting

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 minimize energy usage.

Carpark lighting will be operated with proximity sensors.

Ward corridor lighting will be operated through the BMCS with proximity and photo electric control.

6.3.3 Domestic Hot Water

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

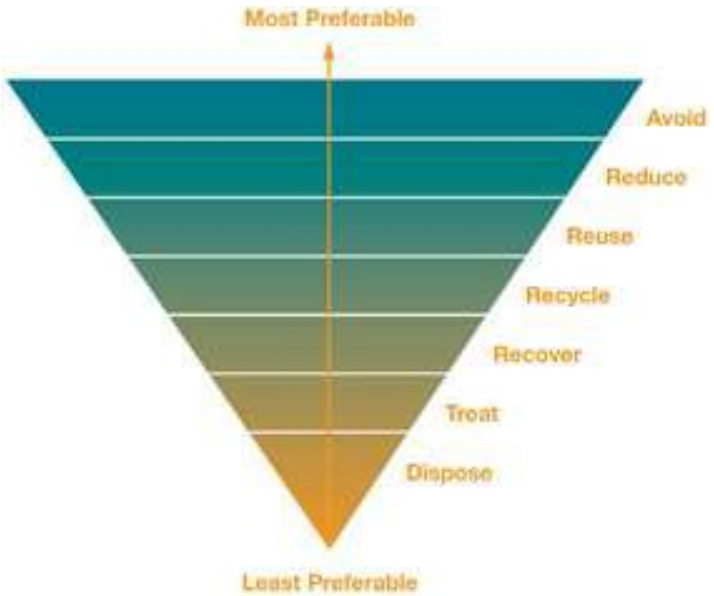

Figure 1 – Waste Hierarchy based on Resource NSW data.

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.

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 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,
- Organized collection and recycling,
- Implementation of purchasing policies to minimize 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 minimization 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 minimization 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 minimization 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 behavior 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

7.6 *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 could be considered as part of the Green Star rating assessment process which is a method of determining the level of achievement for a project.

This Report has been prepared by DSA Consulting to provide an overview of the energy sustainable provisions proposed in the development. To the best of DSA Consulting's knowledge, the report presented herein represents the Client's intentions at the time of printing of the report. However, the development of the project design or impacts of future events may result in the actual contents differing from that described in this report. In preparation of this report DSA Consulting has relied upon data, surveys, analysis, designs, plans and other information provided by the client, and other consultants and engineers engaged in the design of this facility. DSA Consulting has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.

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