# NORTHSIDE DEVELOPMENT ESD MEASURES

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# Report on Architectural ESD measures for Northside Mental Health Facility V1.1 27.05.2016

## Purpose of Report

This report is carried out to advise from an Architectural perspective on the ESD measures within the development known as Northside Clinic St Leonards.
The report responds (for architectural items only) to the requirements outlined in Section 6 of the Secretary's Environmental Assessment Requirements (SEARS) for the Northside Projects State Significant Development (SSD) application (application number SSD 7588). As such content of this report will form part of the Environmental Impact Statement (EIS) that is produced for this development's subsequent SSD application.

Appendices of other consultants have been included for reference purposes only and STH accept no responsibility of the content of these.

## Methodology and terms of reference

For the purposes of this report, ESD measures are described as they relate to definitions within clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.
Where required for benchmarking and performance categorization, the industry recognized Green Star Design and as Built rating tool (updated by the Green Building Council of Australia ((GBCA)) in December 2015 and superseding the *Greenstar – Healthcare V1 tool*) has been used.

Whilst no formal ratings tool targets (such as Greenstar or other ratings system scorecards) are explicitly mandated for the development, the development will none the less be guided by the following ESD performance criteria –

- Section J – Energy Efficiency requirements within Volume 1 of National Construction Code (NCC) 2016
- NSW Health Technical Series TS11 - Engineering Services & Sustainable Development Guidelines
- Australasian Health Facilities Guidelines Part E – Building Services and Environmental Design

## Exclusions

Many Architectural ESD considerations overlap with mechanical, electrical, hydraulic and other services. Whilst the current ESD strategies of other services consultants have been taken into account in consideration of architectural ESD measures, this report does not comment on the specific ESD initiatives of these services and instead provides comments on the measures which are largely or exclusively architectural. For specific services ESD information the services Consultants separate ESD reports (appendixed within the EIS alongside this report) should be referred to instead.

## Architectural ESD measures at Northside

Using the GBCA Green Star Design and as Built rating tool as a guide for categorization[1] (and excluding line items which are primarily the domain of other services Consultants) we can advise on architecturally related ESD measures as follows –

| | |
|---|---|
|  | Refer Services Consultants Reports in appendices or Contractor |
|  | Item N/A or not targeted on this project |

| GBCA CATEGORY | ARCHITECTURAL RESPONSE |
|---|---|
| **Management** | |
| ESD Professional on project |  |
| Commissioning and Tuning |  |
| Adaptation and Resilience |  |
| Building Information |  |
| Commitment to Performance |  |
| Metering and Monitoring |  |
| Construction Environmental |  |
| Operational Waste | The building is currently designed and will be designed in further detail to encourage a minimum of building waste through utilization of standard proprietary sizes and geometries of materials |
| **Indoor Environment Quality** | |
| Indoor Air Quality |  |
| Acoustic Comfort | Acceptable noise levels must comply with AS 2107 recommendations. Vibration in occupied spaces must comply with AS 2670.1 and be prevented by design, selection, installation. High acoustic ratings applied are applied between bedrooms with appropriate lining to this criteria. Acoustic ceilings throughout. |
| Lighting Comfort |  |

[1] It should be noted that the GBCA list is utilized for categorization purposes only; measures undertaken against line items within this list does not denote full compliance with the credit as defined by the GBCA

| | |
|---|---|
| Visual Comfort | Daylight glare control through internal window treatment (blinds) of all windows and external window treatment (fixed louvre) to select windows externally . Visual connection to outdoors throughout bldg. |
| Indoor Pollutants |  |
| Thermal Comfort |  |
| **Energy** | |
| Greenhouse Gas Emissions |  |
| Peak Electricity Demand Reduction |  |
| **Transport** | |
| Sustainable Transport | Site is located within walking distance to bus and major rail interchange (St Leonards Station). Cycling and walking/jogging to work is encouraged via provision of “end of trip’’ facilities including bike storage, staff lockers, change rooms and showers. Fuel efficient transport encouraged with provision of small car spaces |
| **Water** | |
| Potable Water |  |
| **Materials** | |
| Life Cycle Impacts | Life Cycle of Building as a whole extended with future proofing of additional floor for optional extension designed within building, roof over this floor id designed for disassembly |
| Responsible Building Materials | Forest Stewardship Council (FSC) approved timber products, as well low VOC and PVC free or PVC minimised materials and products to be used where feasiable |
| Sustainable Products | As above |
| Construction and Demolition Waste |  |
| **Land use and ecology** | |
| Ecological Value |  |
| Sustainable Sites |  |
| Heat Island Effect |  |

| | |
|---|---|
| **Emissions** | |
| Stormwater |  |
| Light Pollution |  |
| Microbial Control | Anti-micorbial products specified |
| Refrigerant Impacts |  |
| **Innovation** |  |

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# MECHANICAL

# SEARS
# ESD REPORT
## NORTHSIDE CLINIC ST LEONARDS

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## DOCUMENT CONTROL SHEET

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| Title | ESD report |
| Project | Northside Clinic St Leonards NSW |
| Description | SEARS report ESD Clause 1.6 |
| Key Contact | James Pearce |
| Client | Ramsay Health |
| Document Description | Energy sustainable design report submission |
| Project Number | 214090 |

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### Client Status

| | |
|---|---|
| Client Representative | James Pearce |
| Date | |
| Signature | |
| Approved | ☐ |
| Amended as Noted | ☐ |

# *Table of Contents*

# 1 INTRODUCTION

This document presents Ecologically Sustainable Development (ESD) measures proposed for the new proposed healthcare development located at 10 Herbert Street, St Leonard's, NSW

The proposed development is known as "Northside Clinic St Leonards" and is to be reviewed under the Environmental Planning and Assessment Act 1979 Section 78A(8A) and schedule 2 of the Environmental Planning and Assessment Regulation 2000. The Project Application Number is SSD 7588.

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 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

The building is a 7 Level development with a gross upper floor area of **10,300** square metres excluding car park and plant areas.

The layout drawings indicate the following:

- Ground floor with car parking, loading dock, consulting and service facilities.
- Level 1 with car parking, medical records, consulting and main entrance.
- Level 2 with consulting, day patients, kitchen, dining, group rooms, art room and treatment.
- Level 3 with consulting, administration, ECT, education rooms and gymnasium.
- Level 4 with consulting, group rooms and wards.
- Level 5 with consulting, group rooms and wards.
- Level 6 with consulting, group rooms and wards.
- Level 7 with consulting, group rooms and wards.
- Level 8 future ward level currently roof.
- Roof Level, Plant Room.

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

## 1.1 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 located on Frederick Street St Leonards on a sloping site rising to the west. The site is partially protected due to the low position of the site with higher elevations

to the south, North West and western sides, open to the eastern and north eastern sides. The new building has a single storey building to the eastern side Tesla and a three storey warehouse complex to the western side, a three storey bulky goods centre to the northern side across the street, the rising elevation provides a small amount of solar protection to the site as do the surrounding buildings. The new building will rise above the surrounding buildings and hence be the predominant building on Frederick Street, this will provide the ability for the building to accommodate natural ventilation through outside air cycles in the air conditioning system. Mixed mode ventilation could also be accommodated however as the building is a Mental Health facility the use of opening window's will be restricted.

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.

# 2 SUSTAINABILITY

## 2.1 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.

## 2.2 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.

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.

## 2.3 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.

# 3 THERMAL MASSING & BUILDING FABRIC

## 3.1 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.

## 3.2 Solar Access & Glazing

All levels have direct access to daylight from glazing on all façade orientations. The IPU façade areas on Levels 3, 4, 5, 6 and 7 have been allocated to spaces with direct access to the facade glazing. The consulting levels at the on the building are orientated to the northern façade provide natural daylight to the spaces The ECT, activity areas on level 1 and 2 do not require substantial glazing for function, are located in the core areas of the building. The group rooms, dining, and education rooms are fronted to the northern and eastern façade to provide natural light.

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

Internal shading will also be provided to eliminate any occupant discomfort from glare

Glazing systems will exceed the requirements of BCA Section J.

## 3.3 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 metal deck roof.

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.

## 3.4 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.

# 4 WATER SENSITIVE URBAN DESIGN MEASURES

## 4.1 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.

## 4.2 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. Refer to the hydraulic report for actual locations.

## 4.3 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

## 4.4 Efficient Water Use Equipment

Specific equipment using water directly will have water usage considered as part of the selection criteria, including any medical equipment. The use of water cooling to equipment on this site is minimised due to the nature of the hospital (Mental Health)

Cooling towers, have not been considered for this project and all cooling plant will be direct air cooled.

## 4.5 Recycling

No rainwater reuse will be provided due to the capex cost, ongoing energy/maintenance costs and risk to public health that outweighs the benefits.

# 5 ENERGY EFFICIENCY

## 5.1 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.

## 5.2 *Mechanical Services*

### 5.2.1 Cooling and Heating Systems

At this stage of the design development, it is considered that an Air Cooled Variable refrigerant direct expansion system would be utilised for the ward and functional space in combination with a reverse cycle chilled water cooling precooling system for outside air. This provides the best facility for control of temperatures within the various spaces, with individual ward room control and provides the basis for appropriate control of energy consumption for the outside air systems through precooling and heating.

The systems selected will utilise the reverse cycle mode for heating providing the most efficient heating available to the building and reusing the same plant as that selected for cooling.

Outside Air cooling is proposed to utilize air cooled reverse cycle chiller sets, with multiple scroll type compressors to allow close load matching. This proposal matches the BCA efficiencies the COP for the chiller to 2.5 and an IPLV of 3.4

The central VRF system will exceed the BCA section J efficiencies with COP's of 3.0 and IPLV of 3.8 through the use of variable speed compressors and load matching.

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

### 5.2.2 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 the central outside air systems.

### 5.2.3 Insulation

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

### 5.2.4 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.

The carpark ventilation has been design with natural ventilation to the upper level and mechanical exhaust to the lower level operating on a demand based CO monitoring system to minimise the use of energy.

### 5.2.5 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.

## 5.3 *Electrical Services*

### 5.3.1 Power

Supply authority's substations will provide power to the site in line with normal practice.

Power factor correction will be provided on the main supply systems 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.

### 5.3.2 Lighting

LED light fittings will be utilised and where larger fluorescent fittings are required, these will be of the T5 lamp with electronic ballast type.

To minimize energy usage, lighting control will be:

- Provided via switching on motion detectors to offices/store rooms and other non-patient, non-clinical areas
- Where practical, daylight sensors in Group Rooms / Dining Rooms / Lounges, and the like, adjacent perimeter window areas.
- Motion/proximity sensors to Carpark lighting.
- Ward corridor and patient circulation area lighting will be operated through the BMCS with local control at the associated staff station.

### 5.3.3 Domestic Hot Water

Gas fired hot water heaters is proposed.

## 5.4 *Fire and Hydraulic Services*

### 5.4.1 Test Water

Test water will be recycled by pumping the test water back into the fire services tanks.

## 5.5 *Plumbing Services*

### 5.5.1 Domestic Hot Water

- Thicker domestic hot water insulation will be provided to the flow and return domestic hot water pipes achieving a 26% energy saving when compared to Section J7.2 of the BCA.
- Low Flow 3 Star clinical taps will be used
- VSD fitted to all pressure pumps for energy savings

# 6 RECYCLING AND WASTE DISPOSAL

## 6.1 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

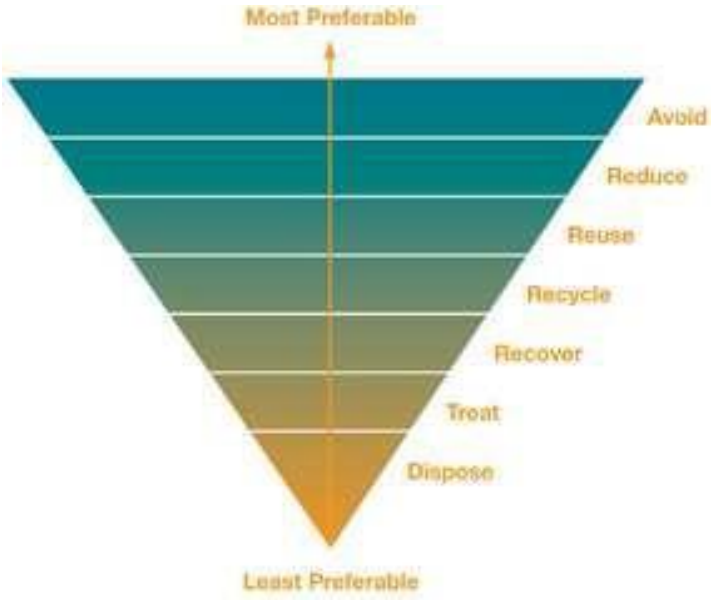


Figure 1 – Waste Hierarchy based on Resource NSW data.

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.

## 6.2 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.

## 6.3 *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 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.

## 6.4 *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.

## 6.5 *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<br>Food wastes- vegetable kitchen wastes | Putrescible | Place in council provided kerbside garbage bins or,<br>Compost on site |
| | Garden clippings, grass cuttings | | Place in council provided kerbside garbage bins or,<br>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 |

## 6.6 *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.

*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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*This report does not purport to provide legal advice. Readers should engage professional legal advisers for this purpose.*

# ELECTRICAL

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Electrical Services as follows:

- High efficiency lighting fittings comprising of mostly LED type with some fluorescent fittings. Lower efficiency incandescent and halogen fittings will not be used.
- Power Factor Correction will be installed to correct power losses to 0.90 to 0.95 lagging to meet and exceed the requirements of the NSW Service and Installation Rules.
- Sub Metering will be installed to allow for the monitoring of the different load groups to meet NCC Section J8.3.

# FIRE &HYDRALICS

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**For item 6 ESD**

**Fire Services**

Test water will be recycled by pumping the test water back into the fire services tanks

**Plumbing Services**

Thicker domestic hot water insulation will be provided to the flow and return domestic hot water pipes achieving a 26% energy saving when compared to Section J7.2 of the BCA

Low flow 3 star clinical taps will be used

VSD fitted to all pressure pumps for energy savings

No rainwater reuse will be provided due to the capex cost and ongoing energy / maintenance costs and risk to public health that out way the benefits

**For item 9**

**Utilities report**

The Sydney Water NoR will satisfy this requirement in conjunction with the Jemena gas offer when it arrives.