WOOD & GRIEVE ENGINEERS

Dubbo Base Hospital
Stage 1 & 2 Redevelopment
ESD Management Plan

Health Infrastructure
23 July 2012
Revision No. 2

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Revision

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2	23/07/2012	Final Issue	CBK
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1. Introduction

This report has been prepared for the Client, Health Infrastructure and the Architects, Cox for the proposed redevelopment at Dubbo Base Hospital, Dubbo NSW.

The aim of this report is to provide an overview, at the early stages of the project, of the Environmental Sustainable Design initiatives for inclusion and consideration in the project.

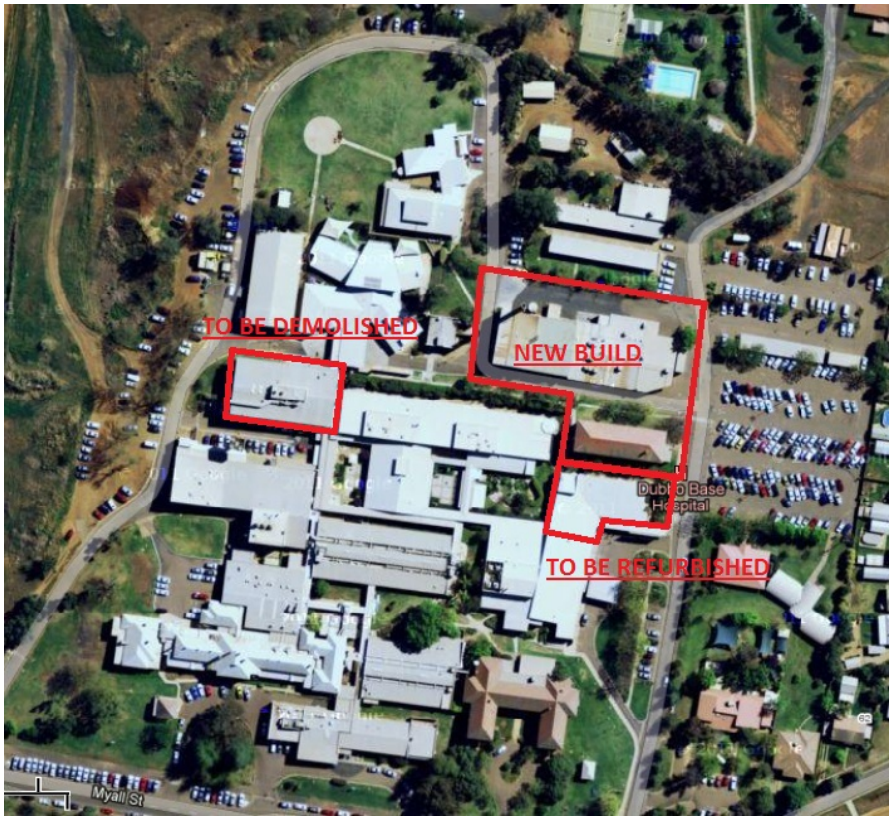
1.1 Overview of the Development

- Refurbishment of existing Admissions/ Outpatients and Medical Records building to accommodate a new front of house area
- Refurbishment of existing Theatres building to accommodate an expanded Renal Dialysis Unit
- Demolition of the existing Maternity building and construction of new car parking spaces on the footprint of the existing Maternity building
- Provision of new landscaping to Renal outlook
- Construction of a new 2 storey building to accommodate a new Maternity unit, Operating Theatre Suite, Central Sterilising Department and Day Surgery Unit. The building is to be constructed with future flexibility to expand to a 3 storey building at a later date.
- The Maternity unit will be located on the first floor, with all other departments located on the ground floor. The new building is to be located within Dubbo Base Hospital's main campus, on the site of the existing Stores and Boiler room building and the existing Nursing Accommodation building.

1.2 Local Council Initiatives

The location of this project is within the City of Dubbo municipal area.

In preparation of this report, Wood & Grieve Engineers has considered ESD initiatives that are in alignment with Dubbo City Council's sustainability strategy (Dubbo Alive) and its' Environmental Sustainability Action Plan.



Existing conditions, aerial view.

2. BCA Section J Certification

The building aims to exceed the minimum energy efficiency requirements of the BCA and will verify compliance through the use of a performance based solution in the form of a JV3 assessment, in accordance with the requirements of the BCA.

Section J of the BCA sets out minimum energy performance targets by which a development must adhere too with specific emphasis on the thermal performance of the building's envelope and the building services which aid to maintain comfort conditions for the building's users.

A performance based solution in the form of a JV3 assessment utilises computer simulation software to model the predicted energy consumption of a building and compare it a reference case as determined by the BCA. This form of assessment takes a holistic approach to assessing a building's performance thus providing much higher levels of flexibility in the design of the building envelope and may allow for more cost effective site specific solutions to be developed.

Note: The current BCA Section J Energy Efficiency requirements nominate improved levels of performance (across all Parts) from previous versions of the BCA. This project aims to comply with and/or exceed these improved levels of performance.

The methodology to provide this certification will be for the Architect (Cox) and the ESD Engineer (Wood & Grieve Engineers) along with the entire design team to carry out design reviews throughout the design phase of the project.

Final review and certification will then be provided by the relevant Building Surveyor.

3. ESD Design Strategy

3.1 Design Overview

Project Name Dubbo Base Hospital Stages 1&2 Redevelopment

Project Address Dubbo NSW

Planning Application Number SSD 5250-2012

Applicant Health Infrastructure c/o TSA Management

Overview of Development

The proposed development at includes the following scope of works:-

New Building Works

Ground Floor

- Day Surgery Unit 1193m^2
- Operating Theatre Suite 2735m^2
- Central Sterilising Department 700m^2

Level 1

- Maternity Unit 2138m^2

The development also comprises a new ICT building. In summary the breakdown of areas are as follows:

Ground Floor

- Workstations 75m^2
- Breakout/Kitchenette 42m^2
- Meeting Room 25m^2
- Office 12m^2
- Toilets 12m^2
- Switch & UPS /Server & Campus Room 110m^2

Refurbishment Works

The refurbishment is over one level in two separate areas and comprises the redevelopment and extension of the Renal Dialysis ward and the reconfiguration of the front of house area. In summary the breakdown of areas are as follows:

Renal Dialysis

- Storage and Support 140m^2
- Treatment Bays 180m^2
- Meeting Room / Staff Areas 220m^2
- Waiting Area 80m^2
- Isolation Bay 60m^2
- Home Dialysis Training 35m^2
- Expansion 110m^2

Front of House

- Affected Area 120m^2

Please refer to the Architectural drawings for layouts and further details relating to the proposed project.

3.2 Sustainability Overview

To date, Wood & Grieve Engineers has been engaged by Health Infrastructure and TSA Management (the client) to review and assess the feasibility of additional Environmentally Sustainable Design (ESD) options for the Dubbo Base Hospital Redevelopment site.

These initiatives involve setting additional sustainability objectives for the site that are above and beyond the minimum performance requirements of the Building Code of Australia.

The client has indicated a preference for the incorporation of economically feasible initiatives that reduce the on going running costs of the facility (energy and water consumption costs). Initiatives will also need to consider the ongoing maintenance requirements and whole of life sustainability assessment.

The following overview of the sustainability strategy for the site aims to provide a summary of the initiatives to be incorporated into the site.

3.3 Indoor Environmental Quality

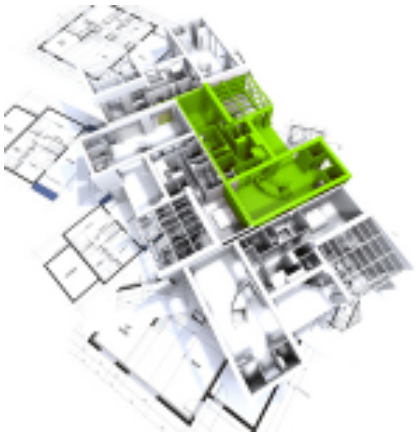
3.3.1 Objectives

To achieve a healthy indoor environment quality for the wellbeing of building occupants.

To provide a naturally comfortable indoor environment will lower the need for building services, such as artificial lighting, mechanical ventilation and air conditioning devices.

3.3.2 Strategies

A healthy indoor environment quality (IEQ) is vitally important for the development to maintain occupant health. Initiatives to be incorporated into the design shall include:-



- Maximising the **Natural Daylight** opportunities throughout the site to improve the wellbeing of occupants, whilst reducing the demand on electrical lighting.

  Lighting controls to common areas will automatically respond during times of adequate lighting to reduce energy consumption.

- The building fabric and mechanical design will target a facility that aims to achieve a high level of **Thermal Comfort**. Building fabric types and the zoning of mechanical plant (for both heating and cooling) will be selected to ensure the facility targets an improved level of occupant amenity.

  Feasibility study on the provision of individual thermostatically controlled heating and cooling to each bedroom to ensure that the occupants are provided with **Individual Thermal Comfort Control**. Thus ensuring that heating and cooling will not occur simultaneously (for energy efficiency consideration) and that the set-points can be modified to suit the occupant's request for temperature control.

- Minimisation of Indoor Air Pollutants through the selection of **Low Volatile Organic Compounds (VOC's)** materials selections. Paints, adhesives, sealants, carpets and wall coverings will all be selected to minimise VOC off-gassing to improve the indoor environment quality of the facility.

- Selection of **Low Formaldehyde** composite wood products to further improve the indoor environment quality.

- Implementation of a lighting design that will incorporate fluorescent luminaries with **High Frequency Ballasts** to minimise low frequency flicker and improve the lighting quality.

- The lighting design shall also consider the **Maintained Illiuminance Level** to ensure that the extent of electrical lighting is not over-designed.

- Consideration of the facility layout in relation to the provision of **External Views** available from the patient bedded zone to promote a visual connection to the external environment.

- Outdoor air introduced into the facility for the supply of fresh-air to be compliant with the AS1668.2 for **Outdoor Air Pollution Control**.

3.4 Energy Efficiency

3.4.1 Objectives

To ensure the efficient use of energy.
To reduce total operating greenhouse emissions.
To reduce energy peak demand.
To reduce associated energy costs

3.4.2 Strategies

Energy and more specifically, energy efficiency and reductions in Greenhouse Gas Emissions, remains a key driver for sustainability within the project. The built environment within Australia contributes over 40% of the total greenhouse gas emissions annually which is among the highest per capita in the world. By planning for greater energy efficiency within new developments, we can set about lowering these annual greenhouse emissions.

Energy Efficiency initiatives proposed for inclusion within the development will include:-

- **Energy Efficiency HVAC Selections** of all mechanical services plant and equipment. Hydronic Heating pumps to be fitted with a **Variable Speed Drive** (VSD) to allow them to respond to the demands of the HVAC system.
- It is expected that the facility's mechanical design will provide zonal thermostatically control to ensure that the HVAC systems run as effectively as possible. This design should ensure that heating and cooling will not occur simultaneously (for energy efficiency consideration) and that the set-point can be modified to suit the zonal requests for temperature control.
- Localised toilet exhaust systems are envisaged to be provided to serve each bedroom to limit the extent of exhaust from the building (thus reducing the make up air heating and cooling loads). These systems will also provide a reduction in fan power energy consumption through their diversified usage.
- Reductions in heating and cooling demands through an **Energy Efficient Building Fabric** design. This will incorporate wall insulation, suspended soffit insulation, roof insulation, shading elements and thermally efficient glass selections (where applicable).
- Replacing existing systems with modern energy efficient HVAC plant.
- **Air Leakage** will be minimised through the building fabric design to ensure that air infiltration
- Consideration of the **Commissioning** process of the Building Services plant and equipment to ensure that "design" energy efficiency translates to "operational" energy efficiency. This initiative will also include preparation of As-Built Operation and Maintenance Manuals for further transfer of knowledge to the site's facility management team.
- The incorporation of **Solar Boosted Hot Water** systems with gas boost for the incorporation of energy efficient and low carbon emissions hot water design for the site.
- The lighting design shall incorporate **Energy Efficient Lighting Fixtures** (typically fluorescent types) along with **Energy Efficient Lighting Controls**. Dimming controls to common areas, motion sensors to transient zones and night-setback modes of operation will all be utilised to minimise the sites lighting energy consumption. The **Lighting Zones** will be laid to allow for operational energy efficiency.
- Reduction of power consumption through the selection of **Energy Efficient Appliances** (i.e. dishwashers, etc).
- Sub-metering of all major energy uses on site to allow for ongoing **Operational Energy Management** works during operation of the facility.

3.5 Water Resources

3.5.1 Objectives

To ensure the efficient use of water.
To reduce total operating potable water use.
To encourage the collection and reuse of stormwater.
To encourage the appropriate use of alternative water sources (e.g. grey water).
To minimise associated water costs

3.5.2 Strategies

Despite recent rainfall events, water conservation remains an important consideration when planning any new development.

Water conserving initiatives being considered include:-

- WELS rated fixtures and fittings for basins, toilets, sinks, urinals and showers. These ratings will aim to comply with the following targets:-
  - 5 Star WELS Basin Tapware (Bathrooms)
  - 5 Star WELS Tapware (Other Basin's i.e. Kitchens etc)
  - 3 Star WELS Showerheads
  - 4 Star WELS Toilets
- Rainwater collection and re-use for irrigation and common area public and staff toilet flushing. In summary, this system may consist of:-
  - A site focused rainwater storage facility.
  - Distribution of the rainwater supply to irrigation requirements, common area public toilets and staff amenities for toilet flushing.
  - Distribution of the rainwater supply to top up the cooling towers and support bin wash facilities.
- Sub-metering of all major water uses on site to allow for ongoing **Operational Energy Management** works during operation of the facility.
- Fire system test water is to be recycled (into the rainwater collection system) to further the from recycled supply

It is envisaged that the above strategies will have the ability to considerably reduce the total potable water demand for both the landscape irrigation and staff and public toilet flushing and thus minimise associated water costs.

3.6 Stormwater Management

3.6.1 Objectives

To reduce the impact of stormwater run-off.
To improve the water quality of stormwater run-off.
To achieve best practice stormwater quality outcomes.
To incorporate water sensitive urban design (WSUD) principles.

3.6.2 Strategies

As a general strategy for stormwater management, initiatives which maximise the on-site reuse of stormwater often assist in effective management of water quality which leaves the site as a result of overflow.

As a starting point for future design and discussion, the following potential stormwater reuse/retention opportunities exist for the proposed development.

Primary Initiatives:

The following WSUD initiatives should be considered as easy to implement, low-cost items for urban stormwater management.

- On-site storage for:
  - Commercial wash down demand (bin wash)
  - Landscape irrigation
  - Toilet flush demand (staff/public areas)
- Reduced flow to sewer through low-flow fixtures and fittings.

Secondary Initiatives:

The following WSUD initiatives should be considered as items for further discussion with the project design team.

- Overall public/green space design
- On-site water features

The following list identifies specific initiatives designed to improve stormwater quality in association with the Best Practice Guidelines for Urban Stormwater Management:

- On-site filtration pits
- Filter traps
- Local detention systems (bio-retention)
- Side entry pits
- Litter collection baskets
- Gross pollutant traps
- Porous pavements
- Infiltration basins
- Sand filters

Stormwater Management Strategy Development

It should be noted that stormwater works strategies have been provided as part of a separate approval process.

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3.7 Building Materials

3.7.1 Objectives

To minimise the environmental impacts of materials used, by encouraging the use of materials with a favourable lifecycle assessment based on the following factors:

- Fate of material
- Recycling/Reuse
- Embodied energy
- Biodiversity
- Human health
- Environmental toxicity
- Environmental responsibility

3.7.2 Strategies

A significant amount of material is expected to be used within the development. Particular environmental issues which shall influence material selection will include:-

- Steel – manufactured from sustainable methods and practices.
- Concrete and timber construction materials sustainable initiatives
- Recycling waste facilities embedded into the waste management plan for the site. A site specific waste management plan should be prepared and integrated into the design of the facility to allow for recycling of waste throughout the life of the facility.

Emissions have the potential to be detrimental to the environment over the expected life of the facility. These emissions are aimed to be reduced through:-

- Refrigerant selections with low ODP ratings
- Insulant selection with low ODP ratings

3.8 Transport

3.8.1 Objectives

To minimise car dependency.

To ensure that the built environment is designed to promote the use of public transport, walking and cycling.

3.8.2 Applicant Response

The development site is located within close proximity to existing public transport infrastructure. With this in mind, the development aims to implement:-

- Cyclist facilities for staff, complete with secure bicycle lockers and showers.
- Promoting access to local public transport routes and local amenities (Trams and Bus links to and from the site).
- Provide up-to-date timetables of local public transport facilities

3.9 Waste Management

3.9.1 Objectives

To ensure waste avoidance, reuse and recycling during the design, construction and operation stages of development.

To ensure long term reusability of building materials.

To ensure a Waste Management Plan has been created where required.

3.9.2 Strategies

Construction and demolition activities account for a large percentage of the waste and recycling generated by a site when compared to its general operation. There is now a growing level of interest in 'green' buildings, which through careful design use less resources and energy than conventional buildings, and provide healthier environments for staff. The nominated Contractor for the development will be required to develop waste and environmental management strategies which ensures that all construction waste is kept to a minimum, while the Design Team has engaged the advice of an ESD Consultant to assist in reducing the design impact on waste generation.

Waste collection systems which provide equal ease for the disposal of both garbage and recyclables generate considerably higher recycling volumes than systems which employ waste separation off site. This project aims to reduce the overall total waste that would be delivered to landfill during typically operation through the introduction of dedicated recycling waste facilities and systems which will give the users the ability to subdivide their waste at source.

A Waste Management Plan will be developed to encourage recycling during the on-going operation of the facility. It will estimate the levels of weekly waste and recyclable volumes and provide recommendations and strategies for the compaction, storage and transportation of waste and recyclable materials from the site.

All recommendations shall be in compliance with council codes, BCA, Australian Standards and statutory requirements.

3.10 Urban Ecology

6.7.1 Objectives

To protect and enhance biodiversity.

To provide sustainable landscaping.

To protect and manage all remnant indigenous plant communities.

To encourage the planting of indigenous vegetation.

3.10.1 Strategies

As the site has been previously developed, where appropriate, landscaped areas will be incorporated into the design to improve the overall ecology of the site. The landscape design will encourage the planting of indigenous plants to assist in both the protection and enhancement of local biodiversity and water efficiency.

3.11 Innovation

3.11.1 Objectives

To encourage innovative technology, design and processes in all development, which positively influence the sustainability of buildings.

3.11.2 Strategies

The following innovative initiatives will be reviewed through the design phase of the project to assess their suitability and viability:-

- Cogeneration
- Trigeneration
- Heat recovery
- Ozone laundry disinfectant systems – to achieve water and energy savings
- Improved energy efficiency systems and strategies
- Exceeding benchmark design standards

3.12 Ongoing Building and Site Management

3.12.1 Objectives

To encourage a holistic and integrated design and construction process and ongoing high performance.

3.12.2 Strategies

While significant consideration is to be given to several design elements of environmental sustainability it is important that a holistic approach is maintained to ensure that various initiatives are managed from inception to project completion.

ESD initiatives included within the management of construction across the site may include:-

- Considering the use of an Environmental Management Plan and / or ISO14001 Accreditation.
- Waste Management Plan (WMP) – Prepare and implement a WMP including the use of recycled construction materials.
- The development of a Building Users' Guide which will be handed to the building owner/user group on completion of the development which advises the occupants of the services and facilities available within the development to assist them in operate the building in an ecological and effective manner.

4. Conclusion

The building aims to exceed the energy efficiency requirements of the BCA and will verify compliance through the use of a performance based solution in the form of a JV3 assessment, in accordance with the requirements of the BCA.

Section J of the BCA sets out energy efficiency performance targets by which a development must adhere too with specific emphasis on the thermal performance of the building's envelope and the building services which are designed to maintain comfort conditions for the building's users.

The methodology to provide this certification will be for the Architect (Cox) and the ESD Engineer (Wood & Grieve Engineers) along with the entire design team to carry out design reviews throughout the design phase of the project.

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