APPENDIX E

ESD Initiatives

Project	Wagga Wagga Base Hospital ESD Initiatives				
Project No.	12775	Ref	Rev2	Date	01.02.13

Executive Summary:

This technical note outlines some of the main ESD intiatives considered by the design team for the current Wagga Wagga Base Hospital (WWBH) schematic design. Our main objectives are outlined below:

- Incorporate good design and management initiatives to encourage sustainable practices during the construction and operation
- Achieve a high level of Indoor Environment Quality, to promote the health and wellbeing of building occupants
- Achieve high levels of energy performance above the baseline standard to reduce environmental and economic impacts associated with excessive energy use.
- Consider specific energy initiatives that will bring real recurrent savings to the project.

The design as a minimum will comply with the energy efficiency requirements of Section J of the National Construction Code (NCC 2012, previously known as the Building Code of Australia).

We are considering the following ESD initiatives, in the design of the building:

ELECTRICAL SERVICES:

1. Daylighting – Active daylight controls (such as day light sensors) will be provided where appropriate within the building to minimise energy usage of artificial lighting.
2. Daylight Glare control – To be achieved through use of external sun shades and/or internal blinds.
3. High frequency ballasts - All artificial light sources will use energy efficient electronic control gear to minimise energy usage within the building.
4. Electric light levels - Will be designed in accordance with the requirements of TS-11, relevant sections of the Australian Standard AS/NZS 1680 and the energy limitations of BCA Section J.
5. External views will be provided to enhance the 'Indoor Environment Quality'.
6. Energy Sub-Metering - Energy sub-metering will be provided to monitor all sub-mains to major plant items and to each switchboard to separately monitor lighting and power sub-circuits in accordance with BCA Section J. This will assist the hospital engineering to monitor and assess the buildings energy load profiles.
7. Lighting Zoning - Artificial lighting will be controlled in zones within large areas to allow sections to be switched off automatically after hours where no movement is present.
8. Efficient lighting - Luminaires with high levels of efficacy shall be used throughout the building to assist in minimising energy usage. Where application suits, it's anticipated that a majority of internal lights will be LED type.
9. Light Pollution - External lighting will be designed to minimise and light spill or obtrusive lighting effects on neighbouring properties.
10. In addition to the above the electrical system will be provided with power factor correction units which will reduce the apparent power thereby minimising energy costs through tariffs.

Consideration is being given to on site electricity generation through PV's and/or cogen/trigen. It is proposed that the main entry canopy to the hospital will house photovoltaic solar panels. The electrical energy generated will be feed back into the hospitals electrical grid. It's anticipated that a voltage readout display will be located main entry foyer. This display could incorporate an information/promotional stand highlighting the benefits of ESD and list other initiatives incorporated into the hospital design.

MECHANICAL SERVICES

The following mechanical services initiatives are being considered for this project:

1. Energy efficient FCU's with EC/DC motors where possible;
2. Pre-tempering of outdoor air with relief using air to air heat exchangers will be used where appropriate;
3. The use of efficient refrigerants that have low ozone depletion potential and low global warming potential;
4. Maximise efficiency of full and part load performance of HVAC systems;
5. Incorporation of passive conditioning techniques where applicable, to reduce the overall air conditioning loads. Techniques to be considered include:
   - Shading of windows to prevent solar penetration in summer but allow passive heating in winter
   - Building thermal mass and insulation combinations where possible
   - High performance building envelope
6. The air-conditioning system is designed to either shut down or be set to a wider temperature control band, when a spaces is unoccupied
7. Dedicated secondary CHW and HHW circuits to ensure WWBH has future means to interrogate and apportion building energy use
8. Provided advice to improve thermal performance of building envelope through effective sun shading, high performance glass and innovative construction details. BCA section J checks were performed on the glazing and facade insulation.
9. High efficiency water-cooled chillers selected to give the optimum coefficient of performance.
10. Chilled water storage enabling chillers to meet low loads while retaining a high COP.
11. The use of a FCU's sytem in parts of the bulding where the functionality concluded that this was the best fit.
12. The use of variable speed drives on all appropriate fan and pump systems, coupled with high efficiency motors.
13. The use of high efficiency equipment such as chillers with environmentally friendly refrigerants such as R134a and R407c and high coefficients of performance and ECDC motors on FCU' equipment.
14. Outside air economy cycles on all appropriate air handling systems.
15. Multi zone face by pass air handling units designed to provide the minimum amount of heating or cooling to zones, thus minimising the possibility of reheating.
16. A fully automated Building Monitoring and Control system to schedule and optimise plant to maximise efficiency.
17. UVC emitter could be installed in AHUs and FCUs to maintain the cleanliness of coils without washing or chemical cleaning.
18. Domestic Hot Water (DHW) preheat supplied from the condenser water circuit to reduce the load on the DHW boilers
19. Varying condenser water temperature control which will allow condensing water temperatures to reduce below their set-point when it is suitable to do so. This will in turn reduce the load on the chillers compressors resulting in significant energy savings.
20. Fully modulating gas boilers with buffer tanks. This will allow the boilers to preform at high efficencies during low load conditions.
21. Condensing Boilers and Low Return Water Temperatures **-** By operating on a 70/50 flow and return system, condensing boilers will operate with higher efficiency.
22. Multi-Zone Air Handling Units with Face/Bypass Coil Arrangement - This minimises the amount of reheat required to different thermal zones on the cooling system.

COGENERATION AND TRIGENERATION

Consideration has been given to the implementation of a cogen or trigen system to reduce carbon emissions. The final financial viability of this was deemed to be satisfactory and will be considered further for inclusion in the project.

Cogen and Trigen:

- Reduce the reliance of grid electricity and hence reduces transmission losses;
- Provide additional backup electricity whilst providing cooling and/or heating;
- Reduce the electricity used by the chiller plant through the use of absorption chillers;
- Minimise the gas used by the boilers plant through the use of hot water heat exchangers;
- Reduce the building's grid electrical demand reducing electricity demand costs.

ARCHITECTURE

The following intiatives are being considered as part of the architectural design for the building:

Green Roof:
It is proposed that a green roof be installed upon the level 2 podium. Some of the benefits of the green roof are:

- Provides a heat sink that will reduce the heat island effect.
- Improve air quality by reducing carbon dioxide.
- Removes heavy metals and other airborne pollutants.
- Attracts biodiversity.
- Promote patient wellbeing through visual and physical contact.
- Improve building thermal performance.
- Provides acoustic insulation.
- Green roof could be integrated with the proposed rehabilitation facility.

Landscape Planting:
The planting selection proposed for the entry forecourt design will predominantly consist of species that are local to the Wagga Wagga district. Native plants will assist in attracting birdlife and help maintain biodiversity. Irrigation reliance will also be reduced.

Interiors:
The following interior finishes and materials will be considered for incorporation in the project design:

- Sustainable plantation timbers
- Recycled timbers for exceptional areas, such as entry areas, main reception counter.
- Floor vinyls with high percentage of recycled content.
- Low voc paints

HYDRAULICS

General:
The design and installation of the hydraulic and fire protection services will be designed to ensure:

- Effective use of energy and resources, including waste minimisation. Recyclable construction materials with low embodied energy and environmentally friendly manufacture shall be used where appropriate. Reduction in ongoing life cycle costs.

ESD Options to be included:

- Water flow monitoring of the main water meter and sub meters to monitor excessive wastage or leakage. These meters are to be pulse type meters wired back to the BMS system. Selection of local manufacturers for pipe material and fittings

Rainwater Harvesting:

Rain water will be harvested to provide landscape site irrigation.

General benefits include:

- Impact upon stormwater drainage network reduced.
- Alleviates reliance upon mains water supply and reduce water consumption costs. Health facilities are generally some of the highest consumers of potable water and it is an environmental