VOS Group
Consulting Engineers

UTS – MULTI-PURPOSE SPORTS HALL

ENVIRONMENTAL AND SUSTAINABILITY PERFORMANCE

14th September 2009

1.0 Introduction

While this project is not registered with the Green Building Council of Australia for a "Design" or "As Built" rating under the Green Star Education V1 tool it is intended that the design complies with the intent of the Green Star rating system and would if a suitable assessment tool be available achieve a 4 Star rating.

The key aspects outlined in the "Arup's – UTS City Campus ESD Masterplan" are considered throughout and are highlighted within the body of this report.

This report has been structured to address the section composition of the UTS Design Guideline Section 25.

2.0 Building Description

The sports hall is located within a sandstone pit, the usual requirement of providing air conditioning to address high solar load is negated. Likewise the fluctuations due to diurnal and annual temperature variation do not affect the building's fabric. The surrounding mass of sandstone offers thermal stability. The combination of the above has a significant impact in reducing the amount or energy that would otherwise be used if the building were located above ground both from a peak energy usage and an operating costs perspective.

3.0 Design

3.1 Protection and Enhancement of the Site

The impact of the building on the surroundings is minimised by virtue that it is located below ground. The existing ecosystem is to be improved by the introduction of indigenous plants residing on the green roof of the structure.

The green roof will reduce rainwater runoff in that it will be used to irrigate the newly created wooded area.

3.2 Energy Efficiency

The sports hall's location beneath ground minimises energy demands in line with UTS's "Design Guidelines". The impact of solar load and of ambient air temperatures is greatly reduced.

To enhance occupant amenity and provide a visual connection to the outside one end of the hall will act as a light well to provide daylight while minimising glare.

3.3 Engineering Services

The sports hall will be mechanically ventilated rather than air conditioned. This will reduce the overall energy usage of the building. The incoming air will be drawn across the large sandstone plenum wall and will be cooled prior to its introduction into the main hall and into the individual rooms. The air will be delivered to the hall using jet diffusers to ensure suitable levels of air movement.

The gymnasium, dance room, seminar room and office will be air conditioned. The chiller serving these areas will also receive its air subsequent to it passing across the face of the sandstone walls. This pre-cooling of the air for heat rejection will improve the efficiency of the chillers.

Lighting design has taken into consideration user comfort and energy efficiency. The lighting design will be documented to comply with the requirements of the BCA, Part J. All luminaires will be equipped with high frequency/electronic ballasts and control gear. The facility's lighting will be controlled via a lighting management control system in conjunction with the Building Management System. Occupancy sensors shall be utilised to ensure unoccupied areas operate only when necessary.

The lift selected will be an energy efficient motor room less lift.

The documentation and specification will be worded to ensure that proper commissioning is undertaken on completion of the installation and that preventative maintenance can easily be undertaken.

To ensure that resource efficiency continues throughout the life of the sports hall the design will incorporate systems to monitor energy and water on an ongoing basis and achieve reduction targets.

3.4 Air Quality

Indoor pollutants will be minimised through the selection of finishes, paints, carpets, sealants and furniture with low levels of Volatile Organic Compounds (VOCs). This will eliminate the health effects of exposure to VOCs, which are consistent with Sick Building Syndrome and include eye, nose and skin irritation, headaches and lethargy. The provision of indoor plants to further reduce VOCs from the indoor air is being investigated.

Local exhaust will be provided to minimise the transfer of odours and water vapour from the wet areas.

If external ambient conditions permit the hall and adjacent areas will be flushed of "night time" air prior to occupancy.

Prior to the building being occupied following construction the building will be flushed by delivering outside air for up to a week. This will reduce the levels of residual volatiles.

The use of a direct expansion system for heat rejection will protect against the release of microbial hazards that could otherwise be found in water based heat rejection systems.

To prevent damage to the Earth's stratospheric ozone layer the air conditioning systems installed will use zero Ozone Depletion Potential and low Global Warming Potential refrigerants in units.

3.5 Water

For the storage of collected rainwater it is proposed that a 70m^3 rainwater tank be constructed below ground adjacent to the building. Prior to entering the tank the rainwater will pass through a coarse screen filter and from the outlet of the tank the water will go through a secondary filtration process for re-use in WC and urinal flushing and irrigation to gardens and lawns.

To reduce water consumption, flow restricting devices and valves shall be fitted to basin and shower tapware, and water efficient fixtures such as low volume dual flush water closet cisterns will be selected.

All tenant areas such as the supplies to plant areas and the hot water plant will be fitted with cold-water sub-meters linked to the BMS system for consumption monitoring. Metering will also be installed to the mains water top-up supply to the rainwater harvesting system.

Areas considered a cross contamination risk will be fitted with a zone backflow prevention device as required by the relevant Authorities.

Prior to the commencement of construction an appropriate Erosion and Sedimentation Control Plan will be implemented in accordance with authority requirements.

3.6 Waste

Waste Management is a key priority for the building's operations. There will be paper, bottle, aluminium and PET recycling. Almost all of the centres waste (aside from food/organic waste) can be recycled.

3.7 Materials

The construction has significantly reduced the absolute quantity of Portland cement used through replacement with alternatives. Portland cement has high embodied energy and significant emissions of greenhouse gases during manufacture.

The majority of steel used in the building's structure will have a post-consumer recycled content 'that's greater than 50%, or is re-used.

3.8 Amenity

The site has excellent access to public transport to limit private vehicle movements. There will 50 bike racks available in addition to shower and change room facilities in order to encourage the use of bicycles.