ESD Report

Dental Hospital (PROPOSED) Revised V2

84-88 Kiora Rd, Miranda, NSW

Vim Sustainability; 31.10.11

South Sydney Corporate Park
Unit W3B3, Westside, 75-85 O'Riordan Street
Alexandria NSW 2015
PO Box 6282, Alexandria, NSW 2015
Phone +61 02 8338 9655
Mobile +61 0401 848 888
Fax +61 02 8338 1022
Email: info@vim.net.au
www.vim.net.au
ABN 69 133 00 44 03
'Sustainability is Survivability'

KIORA RD DENTAL HOSPITAL;
MIRANDA, NSW.

ATTENTION: RUSTY MORAN
MORAN CORPORATION P/L

ESD REPORT FOR DA APPROVAL – REVISED V2

MONDAY 31.10.11

Contents

South Sydney Corporate Park
Unit W3B3, Westside, 75-85 O'Riordan Street
Alexandria NSW 2015
PO Box 6282, Alexandria, NSW 2015
Phone +61 02 8338 9655
Mobile +61 0401 848 888
Fax +61 02 8338 1022
Email: info@vim.net.au
www.vim.net.au
ABN 69 133 00 44 03
'Sustainability is Survivability'

1.0 Introduction

The Kiora Rd, Miranda proposed Dental Hospital development is to be located in the Miranda commercial precinct and is designed to provide a 24 hour Dental Hospital facility. The facility will be providing 24 hour dental care and dental services only. The project is five floors (5) high plus has an upper and lower ground floor configuration. Development Approval is required as the next stage in the approval process.
Vim Sustainability has been appointed the sustainability consultants on the project and has been asked to provide an ESD Report that will identify the principle sustainable initiatives that will be implemented during the design development programme.

2.0 Client Brief

The client has requested Vim Sustainability consider a range of sustainability initiatives that will provide overall resource efficiency including energy and water usage combined with a high level of internal comfort and maximised internal environment quality. In addition renewable energy methodologies are to be implemented as appropriate.

The client is keen to ensure this building provides a sensible but unique approach to heating and cooling the building and is keen to investigate the value of a range of alternative passive and low tech solutions.
Performance targets of around a minimum of 10-15% improvement in energy use over a typical 2011 Section J compliant building are predicted. This means that energy use will be substantially less and water use will also be measurably lower than in a typical commercial building. In addition, waste will be minimised due to a specific waste recycling programme and procurement initiatives.

3.0 Strategy

The proposed sustainability strategy for this particular facility is based on adopting a climate responsive design methodology as the first step of the process. The next step is to identify what are appropriate comfort levels for the inhabitants within the facility with a view to providing a more resource efficient adaptive comfort operational protocol.
Implementation of these two core sustainable design and operational principles will enable the most appropriate built form initiatives to be implemented resulting in improved occupant comfort levels, reduced heating, cooling and electrical loads and subsequent lower resource usage levels.

The next step in the proposed strategy is to identify firstly what passive and then low tech heating and cooling options can be applied to this development A more traditional but energy efficient refrigerant cooling and heating option will be considered if there is found to be minimal value from the use of low tech or passive options.

4.0 Considerations

The following inclusions will be implemented during the design development process. Some preliminary engineering work has been undertaken to identify the engineering efficacy of some of the passive and low tech heating and cooling options. Further design development is required for these items and hence the provision of two heating and cooling options outside of a traditional air conditioning VRV type of system.
All the other listed sustainability items (see below) will be included in the building design.
Please note that this report should be read in conjunction with the supplied explanatory 'cartoon' concept diagramme attached to this document.

5.0 Sustainable Design - Inclusions

A. VRV System for the lower medical floors.

A VRV three pipe heating and cooling air conditioning system will be utilised for the lower floors for the dental centre. This system has a high COP and can provide heating and cooling for alternate rooms at the same time.

B. Use of Natural Ventilation.

An automated yet user overrideable operable window system in conjunction with the ventilated façade, exhaust chimneys located throughout the floor plan and night purging function will serve to cool and ventilate the building over at least 70 per cent of the year. The relatively narrow floor plate will assist in maximizing cross air flow and air movement towards the chimney extract points.

C. Use of double glazed ventilated façade.

The double glazed (Internal skin only) North facing façade will be utilised to ventilate the stale and hot air from inside of the building in summer. In winter the cavity should be closed and serve as a thermal buffer zone or 'blanket' for the building.

The outside skin of the ventilated facade will contain some operable single glazed panels to maximise cross flow ventilation as required. The cavity of the double glazed facade will work utilising both stack effect and wind pressure and will be engineered to maximise daylight ingress and air flow paths across the floor plate.
The summer value of the facade design is that it provides a thermal barrier against convective heat transfer while minimising radiant heat gain from the sun. In addition the automation of this system will allow for cross flow and buoyancy ventilation as required and assist with night purging by providing, in principle, a thermal chimney to expel night time hot and stale air. The system will be linked with other chimneys inside the building as part of the coordinated building natural ventilation regime.

South Sydney Corporate Park
Unit W3B3, Westside, 75-85 O'Riordan Street
Alexandria NSW 2015
PO Box 6282, Alexandria, NSW 2015
Phone +61 02 8338 9655
Mobile +61 0401 848 888
Fax +61 02 8338 1022
Email: info@vim.net.au
www.vim.net.au
ABN 69 133 00 44 03
'Sustainability is Survivability'

In winter the system works in reverse as required. To keep the building comfortable during the colder periods the northern ventilated façade will be closed top and bottom and will heat up from the sun. The closed facade will create a thermal 'blanket' of contained heated air thereby reducing the temperature difference or Delta T difference across the façade thus minimising heat loss out through the facade. Of course the automated system will identify any requirements for ventilation using the CO_2 and internal and external temperature sensors (and external weather station) and the facade will then open as required to ventilate and then close again. This will measurably reduce heating and cooling energy in both summer and winter climates.
It also envisaged that this configuration of the façade will assist in ensuring the building will only require artificial heating and cooling during the extremes of winter and summer therefore noticeably reducing energy use normally associated with this type of facility.

It is important to note the utilisation of the building façade shapes and window types, roof shapes and a range of other built form design solutions can significantly improve the efficacy of ventilation outcomes for a minimum cost.
Further investigative and design works will be undertaken as a component and result of detailed 3D air flow and thermal analysis modelling using the latest building diagnostic software.

D. Use of Solar Chimneys.

To accelerate the air movement and energy free cooling in the building, internal thermal chimneys, separate to the ventilated façade design will be implemented for this project. These chimneys will work together with the windows on the building perimeter in order to maximise air flows and night purging ability. The chimneys could be part of the lift shafts or fire stairs and could also be located as part of the risers. The height of the chimneys above the building roof top and the final shape and detail of these cannot be clarified until further design development occurs. They will though fit inside the building envelope height restrictions and will be as inconspicuous as possible.

E. Double glazed window units, maximised fabric insulation and night purging

Suitable glazing design, ie (double glazed window units) wall and roof insulation levels and all relevant windows and opening ventilation/shading components are automatic and programmable through the IBMS. The night purging though the solar chimneys will also be automated.

F. IBMS

The use of an Intelligent Building Management System (IBMS) to control a range of operational requirements such as heating, cooling, shading, window automation, ventilated façade control, solar cooling chimneys, security and lighting etc. will be implemented.

G. Renewable Energy Photovoltaic Units on the roof

Photovoltaic Cells for energy generation will be implemented. Panels will be located on the roof. The quantity of these panels will be a function of the loads, roof space and other requirements.

H. Thermal mass construction

Exposed thermal mass will be a key feature of the internal building design to improve summer and winter comfort. This will be further quantified and appropriately located during the design development process. It will be part of the overall integrated design strategy.

I. Maximized Integral Environment Quality

Low toxic materials, paints and glues as well as furniture, carpets and curtains will be utilised as part of the overall ESD improvement strategy for maximised internal environment quality.

J. Metering

A suitable metering strategy to monitor and manage water and energy use around the facility will be implemented. High use areas of water or electrical usage shall be independently metered.

K. Compliance with Section J Energy Efficiency 2011 requirements as a minimum standard

Section J 2011 performance standards will be achieved as a base compliance level.

L. Maximised daylight

Where possible daylight will be maximised into the useable spaces. Engineered daylight solutions will be utilised as a major design outcome wherever possible.

M. Sensor control of lighting and equipment

Sensor and automatic control of equipment will be utilised.

N. Electrical lighting

Electrical lighting design will be reviewed and where possible low energy and high lumens equipment will be utilised. Task lighting will implemented wherever feasible.

O. Landscaping

Suitable water efficient landscaping will be integrated into the building design wherever possible.

P. Shading

Suitable shading design will be utilised as required. This may also involve some shading automation.

Q. Water

Q1 Water efficiency devices

All water outlets will be selected to minimise water flow as required. Maximised WELS level taps and spouting etc (Min WELS level 4) will be implemented wherever possible. Sensor control on taps will be considered wherever practicable.

Q2 Capture of rainwater on roof and reuse of same

Rainwater capture will be utilized and the storage of same will be considered for sprinkler pipe supply, landscaping and also for toilet flushing subject to storage and spatial requirements.

Q3 Water Sensitive Urban Design (WSUD) (*Victorian Stormwater Committee, 1999- Best Practice Guidelines*)

Water Sensitive Urban Design principles will be applied wherever possible to this development.

These principles consist of the following:-

Protect natural systems *- protect and enhance natural water systems within urban developments. Promoting and protecting natural waterways as assets allows them to function more effectively and supports the ecosystems that rely on them.*

Integrate stormwater treatment into the landscape *- use stormwater in the landscape by incorporating multiple use corridors that maximise the visual and recreational amenity of developments. The natural stormwater drainage system can be utilised for its aesthetic qualities within parklands and walking paths, making use of natural topography such as creek lines and ponding areas.*

Protect water quality *- improve the quality of water draining from urban developments into receiving environment. Through filtration and retention, water draining from urban developments can be treated to remove pollutants close to their source. This approach reduces the effect that polluted water can have upon the environment and protects the natural waterways.*

Reduce runoff and peak flows *- reduce peak flows from urban development by local detention measures and minimising impervious areas. Local detention and retention enables effective land use for flood mitigation by utilising numerous storage points in contrast to the current practice of utilisation of large retarding basins. This approach subsequently reduces the infrastructure required downstream to effectively drain urban developments during rainfall events.*

> ***Add value while minimising development costs** - minimise the drainage infrastructure cost of the development. The reduction of downstream drainage infrastructure due to reduced peak flows and runoff minimises the development costs for drainage, whilst enhancing natural features such as rivers and lakes that add value to the properties of the area.*

This project intends to reuse as much of the captured roof stormwater as possible, however the overall rain catchment area of the building is low compared to the amount of floor area due to the fact it is a high rise facility . The methods of intended rainwater re use is as follows:.

- Rainwater will be captured and reused as irrigation water for internal gardens or for sprinkler pipe recharge as required and will also be reticulated into the toilets after passing through a simple filtration system to remove any gross pollutants. This will substantially minimise stormwater runoff.
- Any ongoing stormwater runoff that is surplus to the needs of this facility will be of high quality as it will have passed through the stormwater capture and storage system prior to discharge.
- This is protecting the natural systems as much as possible while at the same time integrating the stormwater into the landscape wherever possible.
- An appropriate water filter system will be provided for tertiary treatment of the water before discharge into the stormwater system if required. This is assisting in protecting water quality.
- An inground detention tank will be provided at basement level to ensure flows of stormwater not used on site will be gradually discharged to the street hence reducing run off and peak flows. This strategy will also minimise development costs as the amount of stormwater being discharged from this site and the related off site infrastructure will be measurably reduced.

6.0 Heating and Cooling Design Options

R. Use evacuated solar hot water tubes and wall mounted radiant panels to provide winter heating.

Winter heating can be provided to all floors using energy efficient solar hot water heated radiant panel system.

S. Use evacuated solar hot water tubes and absorption chillers for summer cooling.

Utilising the same radiant panel system it is possible to cool the building in summer using an absorption chiller and using that to cool the water from the hot water panels and circulate that water through the correctly located radiant wall panels.

T. Use of an 'earth tube' cooling and heating system.

An earth tube cooling and heating system will be considered**.** The tubes will be located within the soil beneath car park area and will provide a flow of naturally conditioned air into the usable spaces. This passive system is used in a range of projects around the world including here in Sydney and Melbourne.

U. Ceiling Plenum air distribution

A ceiling plenum air distribution option utilising the conditioned air from the earth tubes will be considered as a maximized comfort and efficiency option. Exposed thermal mass in the ceilings will also be still available for heat exchange.

V. Use of energy generating lifts

Specific lift types that generate energy during use will be considered subject to the client's functional demands.

7.0 Conclusion

The key to a sustainable building design is adopting the appropriate design strategy. They key to that strategy understands a range of relevant criteria. By utilising the correct climate response to design and considering passive and low tech options as the first step in the design process the client can be confident that wherever possible the sustainable outcomes are suited to the location and function of the building while ensuring minimal resource usage.

The systems and processes utilised in the overall design and operations of this development we believe will be the equal of a 5 star Green Star building but in many ways it will exceed that standard. This is because of the value placed, for example, in the natural ventilation and daylighting opportunities. The significant resources normally expended on the validation and documentation process of a Green Star facility in this building are being expended on what the design team considers more valuable real-world initiatives such as the ventilated façade, alternative heating and cooling methodologies, photovoltaic power generators and building automation etc.
The outcome is a cost effective and resource efficient, practical, sustainable and landmark feature building designed to enhance and add quantifiable value to the Miranda community and the overall environment.

South Sydney Corporate Park
Unit W3B3, Westside, 75-85 O'Riordan Street
Alexandria NSW 2015
PO Box 6282, Alexandria, NSW 2015
Phone +61 02 8338 9655
Mobile +61 0401 848 888
Fax +61 02 8338 1022
Email: info@vim.net.au
www.vim.net.au
ABN 69 133 00 44 03

'Sustainability is Survivability'