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ESD Report for the Major Project Application

FOR

For the proposed new commercial development at 17 O'Riordan Street, Alexandria

FOR

Goodman International

07080142

19/09/2008

SUBMITTED TO

Richard Seddon
Goodman International

Quality Assurance

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Contents

1 Introduction

1.1 Introduction

This Ecological Sustainable Development (ESD) Report has been prepared by Sustainable Built Environments (SBE) for Goodman International to accompany the Development Application for the proposed new commercial development at 17 O'Riordan Street, Alexandria for the Australian Red Cross Blood Service (ARCBS).

The project includes:

- Demolition of all existing buildings and structures on the site;
- Construction of a new four storey building containing:
  - A new purpose-built medical laboratory, research and development facility, ancillary office/administration and warehouse and distribution functions having a total gross floor area (GFA) of approximately 13,500 sqm;
  - Single level basement car parking; and
  - Landscaping of the site.

This facility will accommodate a number of activities including blood processing, blood and tissue testing (mandatory and non-mandatory), blood distribution, management and administration of ARCBS and National Transplantation Service (NTS), warehousing and inventory management and research and business development.

Documents

This report is based on a project team meeting, the concept design drawings prepared by Bligh Voller Nield dated the 26th June 2008 and the fitout drawings prepared by Design Inc. dated the June 2008**.**

1.2 Report Format

The aim of this report is to provide the NSW Department of Planning with a clear understanding of the ESD initiatives incorporated into the development.

The methodology of the report is based on a checklist of items SBE has developed to inform our consultancy work. The checklist covers the ESD aspects listed below.

- Energy
- Water
- Indoor Environment Quality (IEQ)
- Transport
- Materials, Waste and Resources
- Social Issues, Health and Wellbeing

The ultimate environmental design aim for our built environment is to create buildings that use no energy, no water, produce no waste in operation or construction and are made from materials that derive totally from sustainable sources. This will not be achieved, but this aim acts as a theoretical lighthouse for the opportunities that should be considered in any project.

Every opportunity to embed sustainable design and technology into the proposed ARCBS building will be explored for feasibility and implemented where it is compatible with the primary function of the facility, which is to provide a rapid delivery of blood and blood-related products.

1.3 Project ESD Context

The major strategic issues that inform the consideration of ESD in this project include:

Director General's Requirements

The Director General's Requirements (issued in July 2008) for the environmental assessment of the project include a Greenhouse Gas requirement "for an assessment of the energy use on site" and to "demonstrate what measures would be implemented to ensure that the proposal is energy efficient".

Building Code of Australia (BCA)

BCA Section J "Energy Efficiency Measures for Class 5-9 Buildings" was introduced in June 2006. The Section J regulations provide minimum energy performance requirements for: building fabric, glazing performance, building sealing, air movement, efficiency of air-conditioning and ventilation systems, efficiency of artificial light and power (internal and external/security) and efficiency of hot water supply. Maintenance provisions are also included to ensure that services and equipment are able to be accessed and that they operate in an efficient manner. A Section J compliance assessment of the building will be undertaken and submitted in order to obtain the Construction Certificate.

2 Energy and Greenhouse Gas Emissions

2.1 Context

The proposed development for ARCBS will generate direct and indirect greenhouse gas emissions principally through energy consumption due to electricity use and transport to and from the site. This section of the report on Energy and Greenhouse Gas Emissions will outline the Director General's Requirements for Greenhouse Gas, the estimated energy requirements for the project and associated greenhouse gas emission impacts. The range of measures available to reduce the development's energy consumption and the resulting greenhouse gas emission reduction will be discussed along with their feasibility for implementation. Initiatives that are considered feasible for implementation in the development will be nominated. However, some options may require a detailed feasibility study in the subsequent detailed design and documentation stage.

2.2 Director General's Requirements (DGRs)

The Director General's Requirements (issued in July 2008) for the environmental assessment of the project include a Greenhouse Gas requirement "for an assessment of the energy use on site" and to "demonstrate what measures would be implemented to ensure that the proposal is energy efficient".

2.3 Greenhouse gas emission sources

References that have informed the preparation of this report include :

- National Greenhouse Accounts (NGA) Factors, Australian Government Department of Climate Change, January 2008 (replaces AGO Factors and Methods Workbook) ;
- Greenhouse Gas Protocol 2004, World Business Council for Sustainable Development and World Resource Institute ; and
- Energy Use in the Australian Government's Operations 2005 – 2006, Australian Government Department of the Environment and Water Resources Australian Greenhouse Office.

The Australian Government's National Greenhouse Accounts (NGA) Factors guideline categorises an organisation's activities into three scopes as follows :

- **Scope 1** – direct or point-source emission factors (e.g. energy use, fuel use, mining activity, manufacturing process activity, on-site waste disposal, transportation of materials, products, people and waste) ;
- **Scope 2** - indirect emission factors from the generation of electricity purchased and consumed by the organisation ; and
- **Scope 3** – other indirect emission factors that are a consequence of an organisation's activities but are not from sources owned or controlled by the organisation (e.g. use of products manufactured, disposal of waste generated, employee commuting).

The proposed ARCBS facility will accommodate a number of activities including blood processing, blood and tissue testing, blood distribution, management and administration of ARCBS and National Transplantation Service (NTS), warehousing and inventory management, and research and business development. Greenhouse gas emission sources associated with the proposed development include (but are not limited to) those listed in the table below :

Table 1: Main greenhouse gas emission sources

Scope	Greenhouse gas emission source
Scope 1	Transportation of materials, products, people and waste
	On-site manufacturing processes
	On-site maintenance and servicing activities
Scope 2	Upstream electricity
Scope 3	Downstream electricity
	Use of products manufactured or sold
	Disposal of waste generated
	Employee commuting and business travel

The main greenhouse gas emission sources for proposed ARCBS facility are expected to be :

- The transportation of materials and products (i.e. distribution activities) ;
- On-site manufacturing processes ; and
- Upstream electricity.

2.4 Estimated energy requirements and associated greenhouse gas emissions

The proposed new facility for ARCBS is a building that accommodates laboratories, which is classified according to the Building Code of Australia as Class 8. It is not possible at this stage of the planning/design process to accurately estimate what the proposed development's energy use in operation will be due to the specific nature of the activities that will take place on the site. If it were a Class 5 commercial office building a preliminary NABERS ENERGY (formerly Australian Building Greenhouse Rating Scheme) assessment of the design could be undertaken to provide an estimate of energy consumption in operation. However, this is not a methodology that can be applied to Class 8 laboratory buildings.

The "Energy Use in the Australian Government's Operations 2005 – 2006" (published by the Australian Government Department of the Environment and Water Resources and the Australian Greenhouse Office) contains data on the performance of each Australian Government portfolio based on the aggregation of data from each agency within the portfolio. Laboratories have been benchmarked.

Australian Government agencies that reported under the "Laboratories" end use category include the Department of Agriculture, Fisheries and Forestry, the Australian Institute of Marine Science, the Department of Defence, Geoscience Australia, CSIRO, ARPANSA, the Department of Industry, Tourism and Resources and the Therapeutic Goods Administration.

This aggregate data for Australian Government laboratories provides a benchmark for energy end use for typical laboratory buildings and can be analysed to provide an estimate of the energy requirements of the

ARCBS development and its potential greenhouse gas emissions in operation. However, it must be noted that very specific activities will take place at the proposed ARCBS facility, so energy consumption is likely to vary somewhat.

The data in Table 2 below is taken from "Energy Use in the Australian Government's Operations 2005 – 2006" and depicts the aggregate energy use by source of Australian Government laboratories.

Table 2: Aggregate data table for Australian Government Laboratories 2005 – 2006*

Energy Source	2005 - 2006
Electricity (kWh)	162 161 681
Natural Gas (MJ)	319 322 425
Greenpower (kWh)	11 383 900
LPG (L)	123 108
LPG (Kg)	-
Heating Oil/Fuel Oil (L)	766
Automotive Diesel (L)	2494
Total (GJ)	947378
Area (m^2)	848 157
MJ/m^2/Annum	**1 117**

*Latest figures available.

The data shows that the average energy intensity of Australian Government laboratories is 1,117 MJ/m^2/Annum in 2005 – 2006.

Table 3 below uses the data from "Energy Use in the Australian Government's Operations 2005 – 2006" and emission factors from the "National Greenhouse Accounts (NGA) Factors" guideline to determine the greenhouse gas emissions associated with the energy consumption of Australian Government Laboratories.

Table 3: Australian Government Laboratories 2005 – 2006 greenhouse gas emissions

	2005 - 2006	Scope	Emission Factor	Greenhouse gas emissions (t CO_2-e)
Electricity (kWh)	162 161 681	Full fuel cycle (Scope 2 and 3)	**0.89** (av. of all Aust. States and Territories)	(162 161 681 x 0.89)/1000 **= 144,324**
Natural Gas (MJ)	319 322 425	Full fuel cycle (Scope 1 and 3)	**60.2** (av. of all Aust. States and Territories)	(319 322 GJ x 60.2)/1000 **= 19,223**
Greenpower (kWh)	11 383 900	-	-	-
LPG (L)	123 108	Full fuel cycle (Scope 1 and 3)	**65.3**	(123 KL x 25.5 x 65.3)/1000 **= 205**
LPG (Kg)	-	-	-	-
Heating Oil/Fuel Oil (L)	766	Full fuel cycle (Scope 1 and 3)	**76.4** (av. EF for heating oil + fuel oil)	(0.766 KL x 38.5 x 76.4)/1000 **= 2**
Automotive Diesel (L)	2494	Full fuel cycle (Scope 1 and 3)	**74.8**	(2 KL x 38.6 x 74.8)/1000 **= 6**
Total Greenhouse Gas Emissions (t)				**163,760**
Total Greenhouse Gas Emissions (t/m^2/annum)				**0.19**

The data shows that a total of 163,760 tonnes of greenhouse gas emissions was produced by Australian Government laboratories in 2005-2006 and that the rate of greenhouse gas emissions produced per m² per annum is 0.19 tonnes.

The data from Table 1 and Table 2 can be used to provide an estimate of the annual energy requirements and associated greenhouse gas emissions of the proposed ARCBS facility.

The proposed ARCBS facility has a gross floor area of 13,500m². According to "Energy Use in the Australian Government's Operations 2005 – 2006" the average energy intensity of Australian Government laboratories is 1,117 MJ/m²/annum. Therefore we can assume that the energy requirements of the ARCBS facility would be similar to 15,079,500 MJ/annum (1,117MJ x 13,500 m² per annum) i.e. 15,080GJ/annum.

Therefore the associated annual greenhouse gas emissions of the proposed ARCBS facility would be similar to 2,565 tonnes (0.19t x 13,500 m²).

2.5 Greenhouse gas emission abatement strategy

A number of initiatives will be implemented into the proposed ARCBS facility in order to reduce energy consumption in the development. These initiatives represent good practice energy efficiency standards which will significantly reduce the greenhouse gas emissions on the site. These include :

- A demand management strategy ;
- Passive Solar Design (i.e. building form and layout, glazing, shading, daylighting, insulation) ;
- Energy efficient lighting and controls ;
- Energy efficient HVAC systems ; and
- Solar hot water heating.

These initiatives are described below, along with measures that have been explored for feasibility and other energy savings initiatives that will be further explored in the subsequent detailed design stage.

2.6 Demand management strategy

A demand management strategy for the building will be developed by the project team during the design process with the aim of reducing energy use and greenhouse gas emissions. It will include minimising the need for energy consumption (e.g. maximising daylighting to reduce the requirement for artificial lighting), providing technological solutions that deliver/convert energy in the most efficient and economically feasible way (e.g. energy efficient lighting fittings) and using renewable energy where technically and economically feasible (e.g. solar hot water heating).

2.7 Building form and layout

Due to the shape and size of the site and the volume of space required for the designated activities, the proposed building is of a square form. The building has a relatively deep plan which, whilst not conducive to daylight penetration and natural cross ventilation, is appropriate for this building's need for a controlled environment. The building form is compact and the layout efficient, with core services grouped together, thereby increasing efficiencies.

2.8 Building envelope – glazing and shading

The design of the building and entry void is conducive to allowing maximum daylight penetration into the office/administration spaces, resulting in energy savings due to the reduced need for artificial lighting during the day. The laboratory spaces cannot receive direct sunlight to their workspaces due to the nature of the activities carried out there. However openness through the laboratory zone will ensure a visual connection to the exterior and that these spaces are well lit. Glazing will be double glazed and will be specified to comply with Section J of the BCA or better, which will further improve the efficiency of the heating and cooling mechanical systems. Solar calculated window shading will ensure that direct short-wave solar access is excluded over the cooling period (to reduce cooling loads) and allowed over the heating period (to reduce heating loads). Generally, external fixed shading in the form of aluminium (Alucobond) fins installed horizontally between the expressed vertical edges of the concrete façade will be provided to North, West and East facing orientations. Due to the strict sealing requirements for laboratories, there will be no openable windows in the building. This Passive Solar Design strategy of maximising daylighting, installing improved glazing and shading appropriate to façade orientation will significantly reduce the energy requirements of the building through passive means.

2.9 Building envelope – insulation and infiltration

Insulation will be specified to comply with Section J of the BCA or better, and the building appropriately sealed to reduce air leakage, which will reduce the heating and cooling load of the mechanical systems, thereby improving energy efficiency.

2.10 Choice of fuel and emergency shut down provision

The use of gas to supply as many of the energy demands as possible is preferable as it produces less than 30% of the greenhouse gas outputs of mains electricity derived from coal-fired power stations.

Electricity from the grid will be the primary source of electricity for the site. A substation will be installed on the ground floor of the building and will contain two 1,500 KVA transformers plus space for the future provision of a third.

Due to the requirement to provide power in case of emergency for a minimum 96 hour period, two in-ground diesel tanks (3,500L each) will be installed as well as a diesel generator and a 2,000L day tank on the roof of the building. A potable water supply tank (150,000L), sprinkler tank (350,000L), hydrant tank (288,000L), rainwater tank (10,000L) and untreated sewerage storage tank (120,000L) will be installed in the basement.

2.11 Green power

Purchasing renewable energy for all (or a percentage of) the site's electricity use removes the greenhouse gas emissions associated with electricity consumption on the site. It also supports the Australian renewables industry. The subscription by ARCBS to an accredited "green power" electricity scheme will be further explored for feasibility in the subsequent detailed design stage.

2.12 Heating, cooling and ventilation

The heating and cooling energy demand for the buildings will be reduced by firstly eliminating, or minimising, the need for heating and cooling, and secondly by installing a heating and cooling system that requires the minimum energy input for the given heating or cooling demand. The mechanical ventilation system will be designed to maintain a comfort band of 22 degrees Celsius plus or minus 1.5 degrees in the internal environment. The primary HVAC plant will consist of air-cooled screw chillers, forced draft boilers, chilled water pumps, HHW pumps and a BACNET/IP compatible Building Management System (BMS). Office areas will be served by chilled water air handling units and a VAV air distribution system. Air handling plant will be located on the roof along with air conditioning equipment, generators, generator day tank and pumps and exhaust fans. The Passive Solar Design of the building has reduced the need for heating and cooling and the installation of the proposed HVAC system and BMS will supply the heating and cooling demand in an efficient manner, thereby reducing the volume of greenhouse gas emissions.

2.13 Natural gas fired cogeneration

Installing a cogeneration plant provides both power and heat to a site. Cogeneration involves the generation of electricity for use on the site from natural gas and the utilisation of the generated waste heat for heating, manufacturing processes etc. Cogeneration is efficient as it lowers fuel consumption (and associated greenhouse gas emissions) by generating heat and power rather than supplying those needs separately. Cogeneration also reduces greenhouse gas emissions by replacing grid electricity with natural gas fired generation (which produces one-third of the greenhouse gas emissions of electricity generated from coal-fired power stations) and by replacing some of the site's heat requirements with waste heat from the generation process. However, cogeneration is also more expensive than grid electricity as the cost of natural gas is higher.

The risks of installing a cogeneration system would need to be assessed as the brief from ARCBS includes a requirement for systems to be as risk-free as possible due to the sensitive nature of the activities that will be carried out in the building. The installation of a cogeneration plant for the proposed ARCBS facility has been explored and it has been determined that it is not a viable option as it does not have a high enough heat demand to make this system feasible.

2.14 Solar hot water heating

A solar hot water heating system (with gas back-up) will be installed. The system will supply the hot water requirement for showers, taps, processing activities etc. on the site. The system will be mounted on the roof of the building as it provides unobstructed solar access from the North. Solar hot water heating systems significantly reduce energy consumption and greenhouse gas emissions by using renewable energy from the sun to heat water. Gas back-up has been selected in place of electric back-up as it produces one-third of the greenhouse gas emissions of electricity generated from coal-fired power stations.

2.15 Photovoltaic electricity generation

Photovoltaics (PVs) provide electricity from renewable sources (i.e. the sun), minimising greenhouse gas emissions. The system could be easily mounted on the roof of the building, as it is optimal for providing unobstructed solar access from the North. The installation of a grid connected photovoltaic array will be further explored in the subsequent detailed design stage. The risks of installing a PV array to supply electricity to this facility would need to be assessed as the brief from ARCBS includes a requirement for systems to be as risk-free as possible due to the sensitive nature of the activities that will be carried out in the building. The installation of a photovoltaic array is also a reasonable capital investment, so feasibility in terms of electricity output and cost-effectiveness needs to be thoroughly explored.

2.16 Lighting

The penetration of natural daylighting into the office/administration areas has been prioritised with the location of these spaces adjacent to the building's perimeter. The entry void, which spans four levels, also facilitates the infiltration of natural light, resulting in energy savings due to the reduced need for artificial lighting during the day, thereby reducing greenhouse gas emissions.

For general lighting, T5 fluorescent fittings will be installed to all stores, clean rooms, laboratories, office areas, meeting/seminar rooms and general corridors. T5 lamps fitted with high frequency electronic ballasts use approximately 25% less energy than the standard T8 lamps, thereby producing 25% lower greenhouse gas emissions. Lower background lighting levels, dimmers, and task lighting will be used and motion and daylight sensors will be installed to ensure that the lights are only operating when required. Suspended ceilings with an integrated light shelf will ensure distribution of reflected daylight from the building perimeter into the deeper office spaces.

Lighting is responsible for around 33% of a commercial building's greenhouse gas emissions. By reducing the requirement for artificial lighting in the building (by maximising use of natural daylighting), then supplying the lighting demand with energy efficient fittings and controlling their operation as required, energy consumption (and associated greenhouse gas emissions) will be significantly reduced in the ARCBS facility.

2.17 Energy metering and monitoring

Energy meters linked to the BMS will be installed for any large energy uses on the site and an energy consumption monitoring plan will be developed to monitor energy use and promote continual improvement. Monitoring and managing energy use on the site facilitates energy efficiency and the reduction of greenhouse gas emissions.

3 Water

3.1 Demand management

Significant reductions in potable water use will be made through the selection of water efficient tapware, toilet cisterns, showerheads, and dishwashers. These fittings and appliances will be one star less than the best available under Australia's Water Efficiency Labelling Scheme (WELS) or better. Low flow urinals (0.8L cube Caroma) will be installed.

3.2 Rainwater collection

The collection of rainwater from the roof of the building will reduce potable water use and reduce peak stormwater flows. A 10,000L rainwater tank will be installed in the basement. The collected rainwater will be stored and re-used for non-potable applications such as landscape irrigation, flushing toilets and to supply the car wash bay in the car park.

3.3 Stormwater retention strategy

A comprehensive water balance study will be prepared and a stormwater retention strategy will be implemented on site which reduces roof and surface water run-off and peak stormwater flows during storm events, and prevents this water from being carried off site directly into river systems.

3.4 Greywater collection

For this site and building uses, greywater collection, treatment and re-use is not considered as economically viable or practical as rainwater collection.

3.5 Sewer mining / blackwater re-use

For this site, which is connected to the existing sewer network, sewer mining / blackwater collection, treatment and re-use is not considered as economically viable or practical as rainwater collection.

3.6 Water Sensitive Urban Design (WSUD)

The area of landscaping on the site is relatively small. Where possible, WSUD measures will be implemented with the aim of minimising impervious surfaces, slowing the run-off of stormwater and facilitating its temporary retention on-site. These WSUD initiatives may include the use of planting on the roof of the building (e.g. raised planter boxes), the planting of drought tolerant native species and the construction of infiltration trenches, swales etc.

3.7 Drought resistant native species

The planting of drought-resistant native species and the zoning of plant species (such as natives, exotics or lawn areas) based on water needs will be prioritised on the site. The existing mature street trees will be retained, with the exception of one street tree which will be replaced.

3.8 Landscape irrigation

Where appropriate, efficient landscape watering systems, such as sub surface irrigation with timers and/or rainwater or soil moisture sensors, will be installed. Water for landscape irrigation will be supplied from a non-potable source in the form of re-used rainwater.

3.9 Fire hydrant test water

Water flushed through the testing apparatus during the building's regular fire hydrant tests will be re-directed to a storage tank (rather than directed to waste), thereby conserving water.

3.10 Water metering and monitoring

Individual water meters linked to the building's BMS will be installed for the large water uses on the site (e.g. landscape watering) and a water consumption monitoring plan will be developed to monitor water use and promote continual improvement.

4 Indoor Environment Quality (IEQ)

4.1 Daylighting

Natural daylighting has been prioritised in the office/administration spaces of the building, providing a better visual environment for occupants and reducing the energy consumption required for artificial lighting. The laboratory spaces cannot receive direct sunlight to their workspaces due to the nature of the activities carried out there. However openness through the laboratory zone will ensure a visual connection to the exterior and that these spaces are well lit.

4.2 Glare control

Glare-control devices, such as internal blinds, will be installed to reduce any visual discomfort to occupants that may be caused by reflected light and to prevent direct sunlight falling on laboratory surfaces.

4.3 Views out

The majority of the workstations in the office areas will be within 8m of vision glazing, creating a direct visual link to the outside which is important for visual comfort, particularly to reduce eyestrain for occupants who work with computer screens.

4.4 Occupant environmental control

Where possible, building users will be given individual control over heating, cooling, ventilation (HVAC) and lighting systems which allows them to optimise their thermal and visual comfort.

4.5 Lighting levels

In order to optimise the occupants' visual comfort, general office lighting levels will not exceed 320 lux, laboratories will not exceed 500 lux, and general circulation and service spaces will not exceed 240 lux. Lighting levels for more specific tasks related to ARCBS activities will be set as required.

4.6 Noise

The design of the building and services will incorporate good practice sound attenuation levels in accordance with AS2107-2000 Acoustics.

4.7 Building layout efficiency

Building layout will minimise circulation and utility spaces whilst maximising useable space in order to conserve non-renewable resources and materials.

According to the Fitout Scope, the non-office laboratory floor plate is to be located parallel to post analytical (office) space and PC2 (Physical Containment Level 2) compliant, thereby maxising efficiency in space utilisation.

Special areas requiring specific temperature and lighting conditions have been grouped together and located in the internal zone of the building, maximising the capacity to share space and equipment across the various laboratory departments. The engineering services infrastructure is to be integrated into the Base Building and adaptability and maintainability prioritised. This internal zone will also accommodates service risers and distribution through lower ceiling spaces.

Storage and special areas (e.g. cold rooms, freezers, darkrooms) are to be centrally co-located to maximise efficiencies between laboratory groupings and departments.

4.8 Volatile Organic Compounds (VOCs)

In selecting sustainable materials, furnishings, furniture paints, carpets, finishes, sealants and adhesives etc., preference will be given to resources that minimise contractors' and occupants' exposure to VOCs.

4.9 Formaldehyde minimisation

In selecting particleboards and composite wood products, preference will be given to zero or low-formaldehyde products.

4.10 Printer/photocopier exhaust

Where possible the fit out will include printers and photocopiers being co-located in a room separate from the general office/administration space and equipped with a dedicated exhaust riser that removes and expels the stale air without it being recycled in order to reduce the VOCs, ozone and particulates associated with the printing process.

5 Transport and Greenhouse Gas Emissions

5.1 Context

The proposed development for ARCBS will generate greenhouse gas emissions through energy consumption due to transport to and from the site. Measures available to reduce the development's energy consumption due to transport and the associated greenhouse gas emissions are discussed below.

5.2 Greenhouse gas emission abatement strategy

A number of initiatives will be implemented into the proposed ARCBS facility in order to reduce energy consumption due to transport (and the resultant greenhouse gas emissions) in the development. These are described in the sections below and include:

- Site selection analysis ;
- Encouraged use of public transport by staff ;
- Preparation of a Travel Access Guide (TAG) ;
- Installation of bicycle facilities ; and
- Dedicated parking spaces for efficient vehicles.

5.3 Site selection and connection to public transport

The proposed ARCBS site in Alexandria will house a number of activities currently being undertaken at various ARCBS sites in NSW. The NSW Operations Centre is currently located at the eleven storey Australian Red Cross Society (ARCS) Building at 153 Clarence Street, Sydney. Due to space constraints, other operational functions have been moved off-site to 78-80 Clarence Street, Parramatta, Newcastle and the ACT. Consolidating these activities into one facility will significantly reduce transport energy use and the associated greenhouse gas emissions as it negates the need for travel between the numerous sites.

ARCBS has undertaken an analysis of prospective sites for the facility in order to determine the optimal location in terms of travel times, distances and access to hospitals, courier depots and the airport. Proximity to public transport routes was also a high priority. Reduced travel times and distances mean that less energy due to transport is consumed, which represents a very significant reduction in greenhouse gas emissions over the lifetime of the building. As a result of the analysis, the most appropriate location for the proposed ARCBS facility was in Alexandria as it enables the average travel time under normal conditions to each delivery area (including hospitals, courier depots and the airport) to be less than thirty minutes.

The selected site is well-located in terms of connection to public transport links, thus reducing staff and visitor reliance on the private car, reducing the impact of the site on traffic congestion and reducing transport energy use and its resultant greenhouse gas emissions and air pollution. The site is located within walking distance (250m) of Green Square railway station and there are numerous bus services along O'Riordan Street with frequent routes to and from the City and suburban centres.

5.4 Travel Access Guide (TAG)

ARCBS is preparing a Travel Access Guide (TAG) for the facility, which will contain information for staff and visitors that aims to manage and reduce the demand for travel to and from the development (in particular to reduce reliance on the private car) and to maximise mode shift to public transport, cycling and walking. The Guide may include the provision of public transport route maps and timetables, and information regarding the site's bicycle facilities and safe bicycle routes to and from the site. Salary packaging options and other incentives relating to the use of public transport for commuting could be outlined. If appropriate, flexible working arrangements could be offered to staff to avoid peak travel times or to work from home periodically.

5.5 Bicycle facilities

The site has weather-protected, secure parking for 10 bicycles located within the basement car parking area. Bicycle facilities (including change rooms with toilets, shower facilities and lockers) are located adjacent to the bicycle storage area. Goodman International will provide 10 bicycle locking points adjacent to the entry of the building for visitors. The provision of these facilities is designed to encourage staff and visitors to cycle to the site, thereby reducing reliance on the private car and reducing the greenhouse gas emissions associated with transport energy use.

5.6 Car parking

There are 97 car parking spaces provided on the site, which complies with the local planning authority's requirements. There will be 60 spaces for staff, 9 spaces for visitors, 1 disabled space and 18 spaces for ARCBS vehicles (e.g. sedans and station wagons). The ARCBS fleet of vehicles and procurement policies may be assessed in the future in order to ensure future procurement of efficient vehicles. By encouraging the use of efficient modes of private transport, the consumption of energy due to transport to and from the site is reduced as are the resultant greenhouse gas emissions. 6 dedicated spaces have been provided in the car parking areas for motorbikes, mopeds and scooters and 13 car spaces have been allocated for small cars.

6 Materials, Waste and Resources

6.1 Waste management

Goodman International will provide dedicated spaces in the office/administration and laboratory areas of the building for the collection, separation and temporary storage of recyclable waste. To facilitate its removal off site, a dedicated space for this collected garbage and recyclable waste is located on the ground floor.

6.2 Low embodied energy materials

In selecting structural building materials or second-fix elements (e.g. work stations, kitchen cupboards), preference will be given to resources which:

- Are locally sourced;
- Are renewable;
- Are from demonstrably sustainable sources;
- Do not contribute to poor air quality or harm the ozone layer;
- Are natural or involve limited processing;
- Have been previously used;
- Have a high content of recycled material;
- Can be recycled at the end of their life; and/or
- Are shown to have a reduced impact on the environment over their full lifecycle (i.e. low embodied energy).

6.3 PVC minimisation

Where feasible, Goodman International will specify alternatives to materials that contain PVC. These could include PVC-free floor coverings, stormwater and sewage pipes, electrical cabling, telephone and data cables, cable conduits, blinds, finishes etc.

6.4 Ozone Depleting Potential (ODP) and Global Warming Potential (GWP)

Where possible, Goodman International will specify insulation (to walls, roofs, ceilings, floors, ductwork etc.) with zero ODP both in manufacture and composition, as well as specifying fire extinguishers and refrigerants with zero ODP and low GWP.

6.5 Provision for future change

The base building has been designed with the flexibility to accommodate future changes and expansion of activities. For example, the building design allows for the future potential expansion of the processing and distribution facilities into the warehousing space at ground level if required in the long term, which will cause minimal disruption to the building structure. The Fitout Scope advocates the use of flexible partitioning throughout the building to provide for future change.

7 Social Issues, Health and Wellbeing

7.1 Staff interaction

The building will provide opportunities for staff to relax, socialise and eat or drink, which can lead to increases in work productivity and workplace satisfaction. These spaces will include:

- Break out spaces, lunch/tea rooms and meeting rooms (adjacent to the office/administration spaces) clustered around the open feature stairway which is located in the void at the entry to the building, thereby promoting staff interaction and visual connectivity; and
- An outdoor terrace with planting on the second floor of the building.

7.2 Building User's Guide

Goodman International will provide a Building User's Guide to building occupants. The Guide will contain information on the building's architectural design and engineering systems and how they are operated to improve sustainability outcomes.

8 Conclusion

A number of initiatives will be implemented into the proposed ARCBS facility in order to reduce energy use and energy consumption due to transport in the development. These represent good practice energy efficiency measures and they will significantly reduce the greenhouse gas emissions on the site. These include :

- Site selection analysis ;
- An energy demand management strategy ;
- Passive Solar Design (i.e. building form and layout, glazing, shading, daylighting, insulation) ;
- Energy efficient lighting and controls ;
- Energy efficient HVAC systems ;
- Solar hot water heating.
- Encouraged use of public transport by staff ;
- Preparation of a Travel Access Guide (TAG) ;
- Installation of bicycle facilities ; and
- Dedicated parking spaces for efficient vehicles.

Every opportunity to embed sustainable design and technology into the proposed development will be explored for feasibility and implemented where it is compatible with the primary function of the facility, which is the provision of a reliable, efficient and timely delivery services for blood and blood-related products by a not-for-profit organisation, the Australian Red Cross Blood Service.