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ESD STATEMENT

FOR

Costco Sydney

FOR

Costco Wholesale Australia Pty Ltd

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18 September 2009

SUBMITTED TO

Patrick Noone

Costco Wholesale Australia Pty Ltd

Quality Assurance

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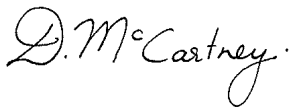
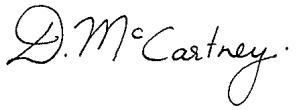
DRAFT	18-08-09		D. McCartney	
FINAL	1809-09		D. McCartney	

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1 INTRODUCTION

1.1 Introduction

This Ecologically Sustainable Development (ESD) Statement has been prepared by Sustainable Built Environments Pty Ltd (SBE) for the Costco Wholesale Australia Pty Ltd to inform the design process and to accompany the Part 3A application for the proposed new Costco warehouse and commercial premises in Auburn, Sydney.

1.2 The proposed development

The proposed development includes:

- The demolition of existing warehouse buildings ;
- Construction of a 3 storey Costco warehouse and commercial premises consisting of 14,000sq.m retail and 2,300sq.m commercial development ; and
- 755 car parking spaces, signage and landscaping.

1.3 Documents

An initial meeting with project team representatives from Costco, JBA Urban Planning Consultants, Group GSA , Hansen Yuncken, Hughes Trueman, Northcroft, Kittleson & Associates, Halcrow and URS provided the overall understanding of the project. The sustainable design meeting held on the 28th July 2009 with SBE, Group GSA and McGregor Coxall provided additional focus on the sustainability and landscape aspects of the project. This ESD Statement was also informed by:

- The Director General's Requirements issued 21st June 2009 ; and
- Concept Plans prepared by Mulvanny G2.

1.4 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 on the 21st June 2009) for the Environmental Assessment (EA) of the project include a requirement to address Ecologically Sustainable Development as follows : "The EA shall detail how the development will incorporate ESD principles in the design, construction and ongoing operation phases of the development."

Auburn Council's ESD Requirements

Even though the proposed Costco warehouse will be approved through the Part 3A process, the local Council's guidelines and recommendations relating to ESD will be addressed in the proposed development. The local Council is Auburn Council. Auburn Council has a number of Development Control Plans (DCPs) but none that specifically relate to ESD. Auburn Council is in the process of consolidating these DCPs into one document; the new Draft Auburn DCP 2009. The current Local Environment Plan (LEP) 2000 (amended on the 11th February 2009) is also in the process of being redrafted, which will become Auburn LEP 2009. ALEP 2000 does not specifically refer to ESD other than in the environmental objectives of the Plan, as follows :

"The specific objectives of this plan in relation to the environment are as follows:
(a) to conserve, protect and enhance the environmental heritage of the LGA,
(b) to ensure that the natural environment is duly considered in the decision-making process,
(c) to consider Auburn's location within the Parramatta River Catchment Area and Cooks River Catchment Area and ensure that development does not adversely impact on these river systems and their tributaries,
(d) to encourage an efficient means of disposing of stormwater that reduces the potential for flooding without reducing the ability to rehabilitate Auburn's waterways,
(e) to ensure that development does not adversely impact on air and soil quality,
(f) to ensure that development does not breach regulatory noise controls,
(g) to promote the conservation of natural resources and non-renewable energy resources through energy efficient design, construction techniques, choice of building materials and the utilisation of ecologically sustainable development techniques,
(h) to minimise waste by promoting the recycling and reusing of materials."

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.

1.5 ESD Opportunities

SBE has developed a matrix to assess and integrate the environmental opportunities for this project. This matrix consists of twelve sustainability aspects including pre-design issues, site planning, architectural design, energy, water, waste, materials, indoor environment quality, landscape, transport, social issues and ongoing management.

The ultimate environmental design aim for our built environment is to create buildings that are comfortable, use no energy, no water, produce no waste in operation or construction and are made from materials that derive totally from sustainable sources. Whilst this is very difficult to achieve in practice, this aim should act as a theoretical lighthouse for the opportunities that should be considered in any project.

1.6 ESD brief

For ESD to be properly integrated in a design, an iterative design process needs to be followed, allowing the team members to identify and pursue opportunities for synergies between the various disciplines and components of the building. An integrated design approach will help to realise the design's full potential. To quote the ESD design guide for Australian Government Buildings written by SBE, integrated design is about making "…each element of the design work more than once".

1.7 Report Format

The aim of this ESD Statement is to provide the Planning Authority with an overview of the ESD initiatives planned for implementation into the proposed Costco 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 following ESD aspects:

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

2 ENERGY

2.1 Context

Energy remains one of the key environmental initiatives in building developments and is the area in which life cycle cost considerations are likely to be favourable. Australians are the world's largest generators of greenhouse gas per capita, and the built environment contributes to over 40% of these emissions.

2.2 Demand management strategy

An energy demand management strategy will be developed during the detailed design process and implemented into the proposed Costco warehouse. Firstly, potential energy consumption in the warehouse will be minimised, then technological solutions provided that deliver or convert energy in the most efficient and economically feasible way. Finally, renewable energy systems will be installed where technically and economically feasible.

2.3 Site orientation

The site is located in the Auburn / Lidcome area and is accessible from Parramatta Road. The main street frontage to the site is Parramatta Road to the South. Haslam's Creek is located to the West of the development and Hertz Rental is located on the adjacent site to the East. The M4 motorway is located immediately to the North of the site. The proposed Costco warehouse covers a significant proportion of the site and is surrounded by vehicular access ways and landscaped areas. The warehouse will not be overshadowed by any adjacent buildings.

2.4 Building orientation, form and layout

The warehouse is very deep plan, rectangular in shape and elongated along its East-West axis. There are parking areas located at the basement and ground floor levels. The Costco warehouse is located above this and consists of a large open space with services areas at the perimeter. The Costco regional office is located to the North – North-West of the building. The North, East and West orientations are likely to require shading over any glazing to avoid overheating in Summer and glare. Skylights will be installed over the retail areas to bring natural daylight into the central spaces of the warehouse.

2.5 Building envelope – glazing and shading

Glazing to the building will be specified to meet Section J of the BCA. Glazing with a U-value of 5.69 and a Solar Heat Gain Co-efficient of 0.96 (i.e. Viridian 6mm clear float glass) was specified for another recently built Australian Costco project. The Sydney Costco site is in the same BCA Climate Zone so glazing of a similar specification is appropriate. The precise specification required will be determined subsequent to a BCA Section J assessment.

A range of measures will be taken to avoid excessive heat gain from glazed areas. The first measure is to shade the glazing on the North, East and West facades where required. External vertical shading devices are proposed for West-facing glazing to office areas. Some shading will also be provided by landscaping. The second measure is the selection of effective glazing. The third measure is to specify aluminium window frames that include thermal breaks, thereby minimising cold bridges and reducing undesirable thermal gains and losses. Appropriate glazing types, thicknesses, coatings etc. for the various solar orientations will be recommended when the BCA Section J energy efficiency compliance assessment is undertaken.

Skylights will be installed above the retail floor. Skylights are beneficial for deep plan buildings as they allow daylight to enter otherwise dark spaces. However, they can also contribute to significant thermal gains and losses. The U-value and Solar Heat Gain Coefficients of skylights needs to be carefully specified. Skylights with a U-value of 3.58 and a Solar Heat Gain Co-efficient of 0.52 (i.e. double glazed 3mm acrylic clear Bristolite Energy Star) was specified for another recently built Australian Costco project. The Sydney Costco site is in the same BCA Climate Zone so skylights of a similar specification would be appropriate. Skylight and glazing specifications will be determined subsequent to the BCA Section J compliance assessment.

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 buildings through passive means.

2.6 Building envelope – insulation and infiltration

Roof, ceiling, wall, floor and building services (pipe and ductwork, hot water tank etc.) insulation will be specified to meet Section J of the BCA. The proposed development is in the Building Code of Australia (BCA) Climate Zone 6. Assuming that the development is BCA Class 5 for the office areas and BCA Class 6 for the retail/warehouse space, the levels of insulation required by the BCA are as follows :

Building Element	**BCA Section J Requirement (Base Building)**
(J1.3) Minimum Roof and Ceiling Total R-Value	3.2
(J1.3) Minimum Total R-Value for a ceiling below a non-conditioned space	1.6
(J1.3) Direction of heat flow - roof	Downwards
(J1.5) External Wall Minimum Total R-value	1.8
(J1.6) Concrete Slab Minimum Total R-value	Nil
(J1.6) Suspended Floor with an unenclosed perimeter Minimum Total R-value	1.5
(J1.6) Direction of heat flow - floor	Downwards

The warehouse should be appropriately sealed to reduce air leakage, which will also reduce the heating and cooling loads of the mechanical systems, thereby improving energy efficiency. The main entrance will be sealed in accordance with Part J3 of the BCA. The construction will entail close fitting internal lining systems to the floor, wall and ceiling/roof to prevent air leakage. These could be in the form of caulking, skirtings or cornices. Any exhaust fans or evaporative coolers in the building will have self-closing dampers. Any flues in the building will be sealed along with any roof lights (skylights), external doors and windows.

2.7 Building envelope – colours

The colour of materials used in the construction of the building envelope can contribute to heat gain during the hotter period of the year.

The use of light coloured roofing materials and light coloured metal wall sheeting in the proposed development will reduce the absorption of solar radiation in summer by the buildings and, consequently, reduce the requirement for cooling.

2.8 Choice of fuel

The use of gas to supply as many of the energy demands in the development as possible is preferable as it produces less than 50% of the greenhouse gas emissions of mains electricity derived from coal-fired power stations. Where feasible, the proposed warehouse will use gas for the kitchen/catering facilities and hot water heating.

2.9 Heating, ventilation and cooling

The energy demand for the Costco development will be reduced by firstly eliminating, if not minimising, the need for heating, cooling and ventilation and secondly by installing systems that require the minimum energy input for the given heating, cooling or ventilation demand.

The Passive Solar Design features of the building (space orientation, improved glazing, shading and insulation) will reduce the amount of energy required for heating and cooling and the installation of the proposed Heating, Ventilation and Air-Conditioning (HVAC) system will supply the demand in an efficient manner, thereby reducing energy costs and the volume of greenhouse gas emissions.

Based on the mechanical systems installed in other Costco developments, the following HVAC design and technology will be installed in the Sydney Costco warehouse :

- Office and retail areas, as well as the café, tyre centre and optical centre will be served by a reverse cycle DX rooftop packaged units. Outside air intake will be directly to the package unit return air plenum with modulating outside air damper. CO_2 sensors will be installed in the air conditioned spaces to control

these dampers. The units serving the office, retail and café spaces will be equipped to operate with economy cycle ;

- The internal space temperature will be within the range of 20ºC and 24 ºC dry bulb for at least 98% of the plant operation time. The relative humidity of office and retail spaces is to be within the range of 40-60% ;
- The minimum outside fresh air rate is provided with additional 50% increase over AS 1668:1991 Part 2, thereby improving the indoor environment quality for building occupants and visitors. The resultant energy penalty will be minimised through the use of heat reclaimed from the exhaust air stream and CO_2 monitoring ;
- Bathrooms and toilets will be fitted with ceiling mounted exhaust fans that comply with BCA Section J Part J5 and will be exhausted in accordance with AS 1668:1991 Part 2.requirements ;
- Heat reclaimed from the warehouse's refrigeration plant (compressor racks) will provide the majority of Domestic Hot Water (DHW) with the remainder heated by a gas boiler, thereby reducing reliance on gas and electricity ;
- A portion of the car parking is at grade and therefore naturally ventilated. The remainder will be mechanically ventilated (in compliance with AS 1668:1991 Part 2) via impulse jet fans controlled by CO sensors, which will minimise the energy consumed by the ventilation fans.

2.10 Lighting

Lighting is responsible for around 33% of a building's greenhouse gas emissions. By maximising the use of natural daylighting, reducing the requirement for artificial lighting, 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 proposed warehouse.

The penetration of natural daylighting into the building will result in significant energy savings due to the reduced need for artificial lighting during the day.

According to the Building Design Guideline Summary dated 28th August 2009 for the Coscto Sydney development, the main sales floor area is to be installed with metal halide high bay light fixtures. To promote energy efficiency, these metal halide lamps will be fitted with electronic ballasts to provide proper starting and operating voltages, to regulate the current flow in the lamp and to manage its wattage. Metal halide lamps are relatively efficient and have a good colour rendering for retail display lighting.

For general lighting, T5 fluorescent fittings will be installed to all office areas, utility rooms etc. 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. In these general areas, lower background lighting levels, dimmers, and task lighting will be used where appropriate.

Low wattage metal halide lamps, Compact Fluorescent Lamps (CFLs) with warm colour rendering and energy efficient dichroic lamps will be used in preference to Halogen downlights (as these are very inefficient with 90% of the energy supplied to the fitting turning into heat). Downlight fittings that do not require a transformer will be installed. For example, the GU10 type fitting allows you to use other types of lamps if desired, including GU10 fluoros and LED GU10 bulbs. If appropriate, Light Emitting Diode bulbs (LEDs) will be used for the lighting of amenity areas (i.e. bathrooms, toilets) and for external illuminated signs as they result in a 50% energy saving compared with standard fluorescent signage. LEDs do not contain mercury, are durable as they do not have a filament (lasting approximately ten times as long as CFLs) and use a fraction of the wattage of incandescent bulbs.

Motion sensors, daylight sensors and/or time switches (with manual override) will be connected where appropriate to selected light fittings in spaces with intermittent use (e.g. meeting rooms, store rooms) to ensure that these lights are only operating when required. As per other Costco developments, perimeter row and the entry area lights will be controlled via Photo-Electric (PE) cells in order to compensate for daylight and control of internal lights will be based on a time clock schedule.

The lighting layout will incorporate zoning according to space usage and proximity to daylighting to facilitate switching control over spaces, thereby improving energy efficiency. Where possible, office lighting switching zones will not be greater than 100m².

As per other Costco developments, car park lighting is to be controlled by time clocks and PE cell inputs.

According to the Building Design Guideline Summary dated 28th August 2009 for the Coscto Sydney development, the external lighting is to consist of metal halide in preference to Low Pressure Sodium (LPS). LPS lamps are generally more efficient than metal halide, but have a poorer (yellow) colour rendering. BCA section J requirements for external lighting (Part J6.5) state that external lighting must be controlled by either a daylight sensor or a time switch and average exterior light source efficacy is to be minimum of 60 Lumens/W (or exterior lighting is to be controlled by a motion detector, when the total perimeter lighting load exceeds 100W). Any decorative lighting or signage must have a separate time switch.

All external light fittings on the site will be directed downwards or reflected off a non-transparent surface to minimise light pollution and to reduce disruption of night time fauna activities.

The lighting will either be controlled by the Building Management System (BMS) or a lighting management system in order to optimise lighting efficiency and to reduce energy costs. A system like Clipsal Bus (C-Bus), a fully programmable lighting management system, turns lights on and off according to a time schedule and can provide significant savings for the proposed warehouse. Daylight sensors, time switches and motion sensors can also be linked into the system.

2.11 Hot water heating

It is proposed that heat reclaimed from the warehouse's refrigeration plant (compressor racks) will provide the majority of Domestic Hot Water (DHW) with the remainder heated by a gas boiler, thereby reducing reliance on gas and electricity.

2.12 Equipment and appliances

Energy efficient equipment and appliances will be installed to reduce energy consumption (and associated costs) and to reduce internal heat loads that can lead to overheating in the Summer months. It is mandatory in Australia for refrigerators, freezers, clothes washers and dryers, dishwashers and air-conditioners to carry an approved energy label. In addition refrigerators, freezers and air-conditioners have regulated Minimum Energy Performance Standards (MEPS). The Federal Government's Energy Rating website (http://www.energyrating.gov.au) enables designers to search and compare equipment and appliances for efficiency. Where possible, equipment and appliances with the highest star ratings available will be selected for the Costco warehouse.

2.13 Power Factor Correction (PFC)

Power factor correction equipment does not reduce the energy consumption of a building, but improves energy efficiency by increasing the capacity of the electrical infrastructure network. If feasible, PFC equipment will be installed to the Costco development on all main switchboards which will reduce the material and equipment required for electrical utility infrastructure as the size of transformers, submains and high voltage reticulation equipment can be downsized and still achieve the same capacity.

2.14 Peak energy demand reduction

Peak energy demand typically occurs during the hot summer months in regular occupancy hours when the HVAC system is providing maximum cooling. This obligates energy providers to have excess power generation and transmission capacity, which often requires secondary power plants to be built or older lesser efficient ones to be retained. Designing a thermally efficient building envelope for the Costco warehouse and using low energy technologies and high efficiency HVAC systems will reduce peak demand and the energy infrastructure required to meet the needs of the building.

2.15 Operation and maintenance manual

The Costco warehouse plant and equipment will be serviced and maintained regularly to ensure that it performs at optimal efficiency. Maintenance requirements and ongoing tuning requirements will be specified for each plant item and schedules provided by the respective plant installation sub-consultants for incorporation into the Operation and Maintenance manual(s). This will assist ongoing managers of the Costco warehouse to correctly and efficiently operate the systems as they were designed, to minimise energy wastage and to improve energy efficiency.

2.16 Energy metering and monitoring

Where feasible, individual energy meters will be installed for any large energy uses on the site. This allows the monitoring and management of energy use, facilitating the detection of any problems and promoting continual improvement. Collected data from energy meter(s) can be used to compare and benchmark energy consumption across the Costco warehouse portfolio. An operational energy management plan will also be developed. Energy

consumption will be monitored at regular intervals (most likely by a Building Management System (BMS)) to determine if HVAC, lighting and refrigeration are operating at optimal efficiency or if some tuning or maintenance is required to improve performance.

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3 WATER

3.1 Context

Australia is the second driest continent on the planet, and Australians are the world's largest consumers of water per capita. Guaranteeing the supply and quality of mains water to cities has significant ramifications in terms of availability of catchment resources and cost of delivery infrastructure.

3.2 Demand management strategy

A water demand management strategy will be implemented for Costco's Sydney warehouse. Firstly, the demand for potable water in the development will be reduced, then technological solutions provided that collect, store and re-use water in the most efficient and economically feasible way. Significant reductions in potable water use will be made through the selection of water efficient tapware, toilet cisterns, low water / waterless urinals, showerheads and water-using appliances (e.g. dishwashers). Where possible, the selected fittings and appliances will have the best available star ratings according to WELS http://www.waterrating.gov.au. The reduction of potable water use through demand management represents minimal capital cost outlay for significant water (and cost) savings during the warehouse's operational life.

3.3 Stormwater retention strategy

Controlling peak flows of stormwater during major rainfall events is a significant problem for stormwater infrastructure. Initiatives to harvest rainwater and stormwater assist in detaining peak flows of stormwater into the drainage system, thereby reducing the likelihood of localised flooding. A stormwater retention strategy will be implemented on the 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 the harbour and/or river systems. Features will include rainwater collection (and on-site re-use) from the warehouse roof and Water Sensitive Urban Design (WSUD) initiatives (e.g. use of landscaped garden areas for infiltration of water into the ground). Stormwater run-off from the parking areas and hard external surfaces will be directed towards a soak-away on the Western side of the site, where it will be filtered through gravel and soil layers with the resultant cleaner water being slowly released to Haslam's Creek. The project team is liaising with Sydney Water who own the banks of Haslam's Creek up to the boundary of the Costco site.

3.4 Rainwater collection

The collection and storage of rainwater run-off from the roofs of buildings reduces peak stormwater flows. Re-use of this water on the site reduces demand on potable water supplies, thereby decreasing water bills. Two rainwater tanks (totaling 100KL) will be installed on the proposed Costco site. The tanks and associated pump room(s) will either be buried underground on the site or located above-ground, which promotes environmental education of site visitors. The collected rainwater will be re-used for non-potable applications such as supplying the toilets, for landscape irrigation, wash down, cleaning and for plant, and/or to supply a car wash bay (if applicable). The rainwater collection and re-use system will be backed up by potable mains water, which will supply these uses when there is inadequate rainwater supply.

3.5 Greywater collection

For this site, a greywater recycling and re-use system is not considered feasible. There will be a large volume of stormwater collected from the expansive warehouse roof which will be re-used on site and it is not anticipated that there will be sufficient demand for a second water re-use system (nor a large volume of greywater from the warehouse to supply it).

3.6 Sewer mining / blackwater re-use

For this site, a sewer mining / blackwater re-use system is not considered feasible as the site is connected to a reticulated sewerage system.

3.7 Drought resistant endemic species

Drought-resistant endemic species that suit the soil conditions typically require less watering than exotic species. Incorporating local indigenous plants increases biodiversity by providing habitat and food for birds, insects and

other native fauna. The zoning, or grouping together of plant species, such as natives, exotics or lawn areas, reduces the overall water consumption, as some species require less water than others.

The Landscape Architects have proposed that the majority of planting on the Costco Sydney site is drought-resistant endemic species which require little or no watering. The soft landscaping requirements outlined in Auburn LEP 2009 will be met. Trees will be planted to provide shade for people and buildings.

3.8 Landscape irrigation

The use of efficient drip irrigation can assist in the conservation of water in the landscaped areas of the site. An efficient drip irrigation system connected to a non-potable water source (e.g. rainwater collected on-site) will be installed to water the facility's landscaping. It is recommended that the irrigation system be designed for water efficiency and include such devices as a water meter, sub-soil drip system, automatic timers, rainwater or soil moisture sensor control override.

3.9 Fire sprinkler test water

It is anticipated that the warehouse will be fitted with sprinklers and fire hydrants. The water expelled during testing of these systems will be directed to a hydrant tank for storage and re-use for non-contact purposes, such as toilet and urinal flushing and/or for landscape watering.

3.10 Water metering and monitoring

The installation of individual water meters for large water uses enables the monitoring of water use, the raising of awareness of water consumption and the promotion of responsible water use, which results in reduced water use and lower water bills.

Where feasible, separate water meters will be installed for large water uses on the site (e.g. landscaping). These water meters will be linked to a central facility (e.g. BMS) so that water use can be measured and monitored. With the aim of promoting continual improvement, a water consumption monitoring plan will be developed that includes a regular review of water use and that enables the detection of any inefficiencies or leaks. A system such as MeterMate (http://www.metermate.com.au), a utility meter monitoring and data management service, could be installed.

4 INDOOR ENVIRONMENT QUALITY

4.1 Context

A number of factors contribute to the wellbeing of building occupants. Buildings must meet the needs of users in terms of thermal comfort, visual comfort and acoustic comfort and be healthy places to work. Creating spaces with high indoor environmental quality improves occupant comfort and can improve overall wellbeing, thereby reducing health related costs.

4.2 Daylighting

Natural daylighting in buildings provides a better visual environment for occupants and reduces the energy consumption required for artificial lighting. Light coloured surfaces will reflect light around the internal spaces, further reducing the need for artificial lighting. The entry of natural daylighting into this warehouse space will be facilitated by the installation of skylights above the retail floor. These will be carefully specified in terms of thermal performance (U-values and Solar Heat Gain Coefficient) in order to prevent unwanted solar heat gain in Summer. Other glazing will also be carefully considered and specified based on maximising daylight and minimising glare.

4.3 Glare control

The use of glare-control devices, such as internal blinds or louvres, for office spaces reduces visual discomfort caused by reflected light and daylighting. Where appropriate, internal blinds will be installed to all windows where glare may adversely affect work spaces, particularly the areas adjacent to the perimeter of the building. These will be manually operable by staff.

4.4 Views out

A direct visual link between the internal office environment and the outside is important for visual comfort, particularly to reduce eyestrain for staff who work with computer screens. The Green Building Council of Australia's Green Star Office Designv3 requirement for External Views recommends that the majority of workstations be within 8m of vision glazing.

4.5 Occupant environmental control

For commercial office spaces, building user control over heating, ventilation, cooling (HVAC) and lighting systems allows the user to optimise their thermal and visual comfort in the indoor environment. Where possible, Costco staff will have control over heating, cooling, ventilation (HVAC) and lighting systems. The lighting system will be designed so that all switches are centrally located and labelled for each lighting zone so that staff have direct control over their visual environment. The introduction of an occupancy based lighting control system (e.g. using lighting zoning, movement sensors in utility rooms, daylight sensors, time delays etc.) will allow smaller rooms and zones to operate only when staff are present, leading to greater control over their visual environment as well as conserving a significant amount of energy. The installation of task/desk lights to workstations will be considered as they augment control over the visual environment and provide an opportunity to reduce ambient lighting levels.

4.6 Lighting levels

Artificial light fittings, lighting layout and lighting levels will be designed and specified to comply with Section J of the BCA or better, to ensure that spaces are not overlit and to improve energy efficiency. Lighting levels will meet the requirements of Australian Standard AS1680 - 1990 Interior Lighting.

4.7 Noise

Low ambient noise levels improve occupant comfort and amenity in the working environment. Potential noise sources that may affect staff include external noise from the surrounding roads and HVAC plant equipment and internal noise from the building occupants. As the warehouse floor will be polished concrete and there will not be many soft furnishings in the space to absorb noise, the building requires careful design to optimise acoustic comfort for the occupants. The building services will incorporate good practice sound attenuation levels in accordance with (or better than) AS2107-2000 Acoustics.

4.8 Volatile Organic Compounds (VOCs)

Materials, furnishings, furniture, paints, carpets, finishes, plastics, wood preservatives, sealants and adhesives that use solvents and other products in the manufacturing process with a high Volatile Organic Compound (VOC) content become volatile at room temperature, contributing to poor indoor air quality and significantly affecting occupant health. Products containing VOCs have been linked to “sick-building syndrome” and worker absenteeism. In selecting sustainable construction materials, furnishings, furniture, paints, carpets, finishes, sealants and adhesives etc., preference will be given to resources that minimise contractors’ and building users’ exposure to VOCs.

4.9 Formaldehyde minimisation

Formaldehyde, a common VOC, is often found in the glues that bind particleboards and composite timber products which are mainly used in cupboards, cabinets, shelving etc. Zero or low-formaldehyde particleboard, chipboard and medium density fibreboard (MDF) products are now widely available on the market. In selecting particleboards and composite wood products, preference will be given to zero or low-formaldehyde products such as E0 Medium Density Fibreboard (MDF).

4.10 Printer/photocopier exhaust

Printing and copying processes can produce VOCs, ozone and particulates, especially in ageing equipment. These can contribute to poor indoor air quality and affect occupant health. Where possible, printers and photocopiers in the office areas will be co-located in rooms separate from the general office space. These rooms will be equipped with dedicated exhaust risers that remove and expel the stale air without it being recycled in order to reduce the VOCs, ozone and particulates associated with the printing process.

4.11 Plants

Indoor plants reduce concentrations of Volatile Organic Compounds (VOCs), thereby improving indoor environment quality and the health and wellbeing of building occupants. Where feasible, indoor plants may be introduced into office spaces. The plants will be selected for their suitability to indoor environments and a maintenance plan put in place to ensure that the health of the plants is conserved. This maintenance plan will include watering and cleaning requirements and will be included in the Building User’s Guide.

5 TRANSPORT

5.1 Context

There are many negative environmental impacts associated with transport to and from buildings, including the consumption of fuel energy and the resultant greenhouse gas emissions, air pollution and traffic congestion. Motorised transport results in the release of benzene, alkenes and other pollutants apart from Carbon Monoxide, Oxides of Nitrogen and Sulphur Dioxide, which are detrimental to health.

5.2 Public transport

Due to the nature of the goods supplied (mainly bulky) and volume of goods purchased by individuals at Costco at any one time, it is acknowledged that the majority of Costco members will be travelling to the proposed warehouse in a private vehicle. However, connection of the Costco development to established public transport routes will assist to some extent in reducing reliance on the private car for travel to and from the site. The proposed Coscto site is located around 1.8 kilometres from the nearest railway station, Auburn and approximately 2 kilometres from Lidcome station. The closest bus service to the site is the 401 route from Lidcome station through Homebush Bay and Newington to Sydney Olympic Park Wharf, where it connects to the ferry service to Circular Quay. The 401 bus passes by the Costco site at the junction of Hill Road and Parramatta Road. These public transport routes will be outlined on the Costco website to encourage visitors to travel to the site sustainably.

5.3 Bicycle facilities

Good bicycle path connections from a site to any existing on-road or off-road networks encourage people to cycle as an alternative to car use. There do not seem to be any dedicated bicycle paths in the immediate vicinity of the proposed Costco site. However, there is a shared pedestrian / cycle route on the other side of Haslam Creek that connects to the residential development opposite Sydney Olympic Park. There are also a few on-road routes near the Costco site listed by the Roads and Traffic Authority (RTA), who have published a map that grades certain roads in the locality based on their suitability for bicycling. This map can be found at:
http://www.rta.nsw.gov.au/usingroads/downloads/sydney_parramatta_bikemap_p2.pdf

Provision has been made in the Costco development for secure weather-protected bicycle storage for staff on the Western side of the building at the car park level. The provision of this storage as well as associated facilities (e.g. toilets, lockers) encourages staff to cycle. Bicycle locking points for Costco visitors will be installed outside the main entry. The provision of these facilities is designed to encourage staff and visitors to cycle to the site, thereby reducing reliance on the private car. Costco's website will contain information on these bicycle routes and facilities.

5.4 Car parking

Costco's business model relies principally on transport to and from the site by private vehicle. The greenhouse gas emissions produced as a result of this transport energy use will be mitigated to some extent by the fact that the Costco warehouse is a "one-stop shop" i.e. the number of shopping trips by car for a typical person is reduced by providing a retail outlet where a large variety of goods can be purchased in one location.

A number of car parking spaces on the site will consist of prioritised parking for the exclusive use of small, fuel-efficient and hybrid vehicles (e.g. Toyota Prius, electric cars) and for motorbikes and mopeds. These initiatives raise awareness and encourage the up-take of fuel-efficient vehicles, thereby contributing to a reduction in air pollution due to transport.

5.5 Green Travel Plan (GTP)

Costco Wholesale Australia Pty Ltd will consider the development and implementation of a Green Travel Plan (GTP). GTPs consist of an investigation into transport options for the proposed site and an assessment of sustainable transport alternatives. A suite of initiatives, activities and actions are then implemented to encourage travel behaviour change amongst staff and visitors. A Green Travel Plan aims to encourage people to choose sustainable transport options such as walking, cycling, car pooling and public transport.

6 MATERIALS, WASTE & RESOURCES

6.1 Context

The environmental impacts of material usage in buildings and developments are numerous and include the depletion of natural resources, the degradation and pollution of the environment in their extraction, production and use, and health impacts associated with off-gassing of pollutants in production and use. Waste created by the building industry accounts for more than 40% of waste going to landfill. One of the major imperatives of sustainable design is to reduce, reuse and recycle. The environmental opportunities pertaining to waste management include the reduction of demolition and construction waste streams, as well as those resulting from ongoing operational waste during the life cycle of the building.

6.2 Low embodied energy materials

In selecting structural building materials or second-fix elements, 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).

Due to the excavation of the site for basement car parking, there will be a substantial amount of soil and clay that will not be able to be reused on this site. It is proposed that this additional material be re-used on other sites in Sydney that require fill, which will avoid this volume of soil going to landfill.

If feasible, a proportion of Portland cement for the in-situ and pre-cast concrete components of the project will be replaced by an industrial waste product (i.e. flyash), thereby reducing the embodied energy and resource depletion occurring through the use of concrete. If possible, the steel for reinforcing the concrete slab and for other applications within the project will have a recycled content, thereby reducing the embodied energy and resource depletion associated with the use of virgin steel.

If possible, the existing concrete pier wall on the boundary of the Costco site with the Sydney Water easement to Haslam Creek should be retained, rather than demolished and rebuilt in close proximity. Retention of the wall conserves resources and its inherent embodied energy. Subject to approval, planting to Sydney water lands between the wall and existing culvert edge can form part of the Costco development. This will screen the existing wall and aid in bank stabilisation.

100% of timber from sustainable sources will be specified for the Costco Sydney development subject to availability.

6.3 Reuse of existing materials

Re-using existing materials from the demolition process reduces the requirement for new construction materials, thereby reducing the embodied energy invested in the warehouse development and the volume of waste going to landfill. The Costco site is a brownfield site i.e. it has been previously built upon. Where appropriate, materials from the demolition of the existing buildings and structures on the site will be reused for the construction of the warehouse and associated site works. This could include re-using crushed bricks, concrete and other aggregates as base materials for internal roads etc. If these recouped materials are not appropriate to use on this site, they will be stored and sent for recycling (see section 6.4 below).

6.4 Construction waste management plan

A Construction Waste Management Plan (CWMP) will be prepared for the Costco warehouse development and will identify types of demolition and construction waste on the site and how it is to be collected, separated and stored. Estimated waste targets will be identified as well as how these targets will be achieved. During the

construction phase the contractor (and sub-contractors) will be required to keep records that demonstrate the volume of waste recycled, including waste disposal reports that detail the weight of materials recycled or sent to landfill.

A minimum construction waste target of 60% will be set (this is a target set under the NSW government "Waste Challenge" initiative). Best practice waste targets are 95% reduction in waste to landfill and 90% reuse of demolition material.

6.5 Operational waste management plan

The implementation of an Operational Waste Management Plan (OWMP) reduces the operational cost of a building and minimises the volume of waste directed to landfill. Dedicated spaces will be provided in all specialist areas of the warehouse (e.g. offices, food court, loading dock) for the collection, separation and temporary storage of recyclable waste. Paper/cardboard bins will be located in all of the aforementioned spaces with additional bins for tin, glass, plastics and non-recyclable material located in the kitchens, food court and food preparation areas. To facilitate its removal off site by Council or private contractor service vehicles, a centralised and dedicated space for the collected rubbish and recyclable waste will be located to the North-East side of the warehouse (near the compactors and balers).

6.6 Poly Vinyl Chloride (PVC) minimisation

Where feasible, alternatives to materials that contain PVC will be selected for the Costco Sydney project. PVC is typically found in stormwater and sewage pipes, electrical cabling, telephone and data cables, cable conduits, floor coverings, blinds, finishes etc. Cancer-causing chemicals are used in the manufacture of PVC. The production of PVC also creates highly toxic by-products. PVC cannot be easily recycled due to the release of toxins when it is melted down. PVC disposed of in landfill releases dioxins that can contaminate the groundwater below. For example, linoleum or Marmoleum could be specified as an alternative to vinyl flooring, High Density Polyethylene (HDPE) pipes as an alternative to PVC drainage pipes and polyethylene as an alternative to PVC power cables.

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

Ozone depleting substances, such as CFCs, HCFCs, HFCs and halons, are responsible for thinning the stratospheric ozone layer, heightening exposure to ultraviolet radiation and contributing to high rates of skin cancer. Products with high GWP release greenhouse gases into the atmosphere and contribute to global warming.

While CFCs have been banned since the end of 1995, the Montreal Protocol requires that HCFCs be phased out by 2020. HCFCs are often found in insulation materials, particularly as blowing agents for rigid insulation, such as extruded polystyrene. When selecting insulation care must be taken to avoid insulation with Ozone Depleting Potential both in their manufacture and composition. Although most refrigerators and air-conditioning manufacturers are phasing out the use of HCFCs in refrigerants, many refrigerators still contain HCFCs in their insulation. Halons are extremely destructive to the ozone layer (10 times higher than CFCs) and consequently have a high ODP. Halons have been mainly used in fire fighting equipment and are banned from general use in Australia (with the exception of use on aircrafts). There are a number of environmentally-friendly alternatives (based on the nature of the fire) including carbon dioxide and water-based extinguishants.

Where possible, insulation to walls, roofs, ceilings, floors, ductwork, pipework, hot water tank etc. will be specified with zero ODP, both in manufacture and composition. Fire extinguishers and refrigerants with zero ODP and low GWP will also be specified.

6.8 Environmentally responsible manufacturers

Items such as office workstations, flooring, walls and partitions, chairs, tables, storage and joinery will be selected based on their low impact on the environment and the environmental credentials of the manufacturer. Costco will consider the following issues when dealing with product manufacturers :

- How many years is the manufacturer's warranty on the item?
- Does the item have an "Eco Preferred Content" (pre-consumer recycled content and/or post-consumer, recycled content and/or organically certified renewable product content and/or Forest Stewardship Council Certified timber content)?
- Does the manufacturer have an Environmental Management System (EMS)? Does this EMS cover regular energy, water, waste and emissions monitoring and reporting? Is the EMS ISO14001:2004 certified?

- Is the item, or part of it, “designed for disassembly” i.e. can be readily disassembled using non-specialist tools into elemental components for re-use or recycling?
- Is it possible to have a contractual arrangement with the manufacturer to take back the item at the end of its service life for re-use, recycling or re-processing?
- Is the item Good Environmental Choice Australia (GECA) certified?

7 SOCIAL ISSUES

7.1 Context

One of the three cornerstones of sustainability is enhancement of social issues. Creating a safe and healthy physical environment that meets the needs of building occupants and that promotes social interaction enhances the wellbeing of the building users.

6.9 Social interaction

The building and surrounding site provides some opportunities for Costco staff to relax, exercise, socialise and eat or drink, which can lead to increases in work productivity and workplace satisfaction. These spaces include a gym, a break out space in the regional office and an adjoining outdoor terrace as well as the landscaped areas surrounding the Costco warehouse. Visitors also have the opportunity to relax, eat and drink at the food court inside the warehouse. The landscaped forecourt to the warehouse is fully accessible with paved areas for wheelchair access and shade trees and shrubs.

7.3 Safety in design

Safety in design (also known as Crime Prevention Through Environmental Design) principles will be integrated into the proposed new warehouse and surrounding site. This involves careful design of the building and site landscaping with the aim of reducing the opportunity for crime.

7.4 Universal access

The built environment contains physical and non-physical barriers that can have a significant impact on freedom of movement and, consequently, freedom of choice for a number of people, particularly those with disabilities, limited mobility and the aged. Universal access promotes high level of accessibility within the built environment for people of all ages and abilities. The project team has worked towards the elimination of barriers to promote equitable access within the built environment of the warehouse and site. Documents referred to include relevant Building Code of Australia (BCA) requirements and the Disability Discrimination Act 1992 (DDA92).

7.5 Building User's Guide

A Building User's Guide will be provided to Costco staff. The Guide will contain information on the building's architectural design and engineering systems and how they are operated to optimise sustainability performance during the operational phase. Where relevant, energy and water metering and monitoring information will be included so that energy and water consumption is reviewed, problems pinpointed and improvements made. The Guide will contain information on waste and recycling i.e. what can be recycled, where the collection bins are and schedules for collection. Care and maintenance guidelines will be compiled on the warehouse and office's furniture, fittings and equipment. There will be a Supplier Index of all suppliers of furniture, fittings and equipment including contact details, warrantees etc. Likewise, the contact details of operation and maintenance contractors will be included. Details of environmentally responsible cleaning products and practices will be tabled. Details of sustainable transport options for staff and visitors to the site (e.g. public transport to the site, bicycle facilities) will be included.

Note that this is in addition to the standard Operations and Maintenance (O&M) Manual that is typically referred to by building managers.