

Table 2.1 Compliance with Botany Energy Efficiency Development Control Plan

DCP Provision	Design Response	Compliance
3.1 Solar access and overshadowing		
<p>Commercial and industrial buildings should be designed to maximise the benefits of solar energy through appropriate orientation. The siting and orientation of the building shall also ensure that the proposed building does not materially increase overshadowing to adjoining properties and reduce the level of solar access to these buildings.</p>	<p>Proposed buildings and structures will be such that siting and orientation will utilise natural lighting (where possible) throughout the day using translucent panels, windows and roof sheeting in warehouse areas.</p> <p>The setbacks to adjoining properties will ensure that there will be no adverse overshadowing impacts.</p>	<p>✓ □ Complies</p>
3.2 Building Form & Construction		
<i>Renewable/Sustainable Building Materials</i>		
<p>All building materials chosen shall consider the following environmental impacts:</p> <ul style="list-style-type: none"> • damage suffered by the environment during extraction of raw materials; • renewability of raw materials; • recycled content; • solid, liquid and air pollution due to manufacture and production; • embodied energy; • environmental impact during life cycle; • waste and packaging; and • recyclability of the demolished materials. 	<p>Materials to be utilised in the building construction will include concrete, steel, wood, aluminium and masonry from renewable/sustainable sources. Such materials are commonly used in industrial building construction, are not scarce or in short supply and have similar or lower environmental impacts to other forms of building materials.</p> <ul style="list-style-type: none"> • Building materials shall be. <ul style="list-style-type: none"> ▪ Insulation: Roof or ceiling – R2.5 ▪ Insulation: Walls – R1.5 ▪ Glazing: Shading co-efficient ¼ 0.4 ▪ Glazing: U-Factor ³ 6 W/m2 degrees centigrade <p>Glazed areas will typically not comprise more than 50% of the total wall area. Where greater, high efficiency glass will be used.</p> <p>The use of recycled materials will be dictated by the building requirements of the warehouses. Typically, the use of recycled products will be used in civil works for the establishment of the ground surfaces, roads and landscaping areas. The fill material to be used will be clean (VENM) material utilised from excavation of other building sites or road projects.</p> <p>Materials used will be recyclable.</p>	<p>✓ Complies</p>
<p><i>Thermal Mass</i> Use building materials that have a higher thermal mass such as bricks, concrete and stone.</p>	<p>Materials such as bricks, concrete and stone will be used in the building construction to increase thermal mass. Typically walls of warehouses will be precast tilt concrete panels.</p>	<p>✓ Complies</p>

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<p><i>Insulation</i></p> <ul style="list-style-type: none"> Bulk insulation traps air providing a physical barrier to the flow of heat and includes materials such as fibreglass, cellulose fibre, natural wool and expanded polystyrene. Bulk insulation must be installed in compliance with Australian Standard AS 3999. Reflective insulation reduces the flow of heat from a hot to a cold body and includes such materials as reflective foil laminate or sarking. Reflective foil insulation must be installed in compliance with Australian Standard AS 1904 Code of practice for installation of reflective foil laminate in buildings. 	<p>Bulk insulation traps will be used in walls and in the roof cavity (if any) in compliance with AS 3999.</p> <p>Roof area will have reflective insulation and in accordance with AS 1904.</p>	<p>✓ will be complied with where required for section J</p>
<p><i>Shading Devices</i></p> <ul style="list-style-type: none"> Shading devices such as flexible canvas devices should be used to shade shopfronts which receive direct summer sunlight. Vertical shading devices such as blinds, shutters, adjustable awnings and landscaping should be used for east end west facing windows. North facing windows should be shaded from direct summer sun by external, horizontal devices such as awnings, upper floor balconies, eaves and overhangs. 	<p>Where staff areas are to be provided, the use of shading devices such as flexible canvas, blinds, adjustable awnings and shutters will be used for eastern and western facing buildings.</p> <p>Northern facing buildings and windows will have permanent shading to protect from the summer sun.</p> <p>Landscaping will be utilised in out door areas.</p>	<p>✓ Complies</p>
<p><i>Roof and Wall Colour</i> Use lighter, more reflective colours for external walls and roofs to reduce heat gain in summer.</p>	<p>Reflective weather resistant light coloured paints and surface coatings will be utilised on all buildings.</p>	<p>✓ complies</p>
<p><i>Windows & Glazing</i></p> <ul style="list-style-type: none"> Areas of glass to the east, west and south should be minimised. Windows should be double glazed as a minimum. Glazing for office spaces should be tinted to minimise heat gain through the glass and eliminate glare within the office space. Windows should be selected for functional purposes only, either to provide natural lighting or access to a view or to enhance the streetscape. Heat absorbing glass should be used in commercial office buildings. Window frames should have low thermal conductivity. To reduce the heat flow arising from a temperature difference across the glass, the U value shall be reduced to at least 6. 	<p>The main areas of glazing will be on the office component of the warehouses. These have been sited to minimise east/west exposure to the maximum extent possible All windows to be 9mm double glazed or similar for all buildings.</p> <p>Office spaces will have tinted windows to minimise heat gain.</p> <p>Glazing and windows will be selected for their functionality.</p> <p>The application and use of heat absorbing glass will be used in all office components.</p> <p>Window frames will be of aluminium construction.</p>	<p>✓ complies</p>

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	The U value will be 6 or greater.	
3.3 Heating, Ventilation & Air Conditioning (HVAC)		
<p><i>Planning & Design</i></p> <ul style="list-style-type: none"> The usage patterns, orientation and location of a building's occupants should be considered in the initial design of space heating and cooling. A combination of passive methods such as direct solar access, window glazing, window shading, appropriate insulation and sealing and entry design (ie air locks, rotating doors) and natural ventilation can be used to reduce the overall use of mechanised systems. In industrial units and warehousing, goods doors should be located or adequately partitioned away from areas that may require mechanised heating or cooling 	<p>Passive and artificial heating will be used throughout the buildings. These involve both direct solar access and insulation.</p> <p>In warehouse areas, mechanical ventilation will be used where passive ventilation cannot.</p>	<p>✓ Complies</p>
<p><i>Air Conditioning</i></p> <ul style="list-style-type: none"> Air conditioning systems should be well insulated, particularly those systems located in roof space. Air conditioning ductwork and pipework should be designed to achieve low pressure drops within the constraints of the building which will minimise the pumping and fan energy consumed by the reticulation systems. The main areas of energy wastage in air conditioning systems have been found to be excessive operating hours, malfunction of the outside air/economy cycle, overlapping between heating and cooling and absence of routine maintenance. Air conditioning should be controlled by thermostats located within the air condition spaces. Small office buildings can be air conditioned by reverse cycle air conditioning units. Reverse cycle air conditioning units can be controlled individually and operated independently of the rest of the building if needed out-of-hours. Large buildings should consider central plant/gas chilling depending on life cycle costs. Central plant areas can have a coefficient performance of 5 or 6 with gas heating. 	<p>The building is to be designed to be naturally ventilated where appropriate and possible, with the addition of air conditioning providing supplementary ventilation and temperature control. Warehouses will have permanent roof venting.</p> <p>Air conditioning systems will be on timer controls with operation only in peak temperature conditions. Thermostats will be on all systems to control the flow and temperature in air conditioned areas.</p>	<p>✓ Complies</p>
<p><i>Heating, Ventilation & Air Conditioning (HVAC)</i> HVAC systems should be designed to minimise energy use. Points that should</p>	<p>HVAC systems will be designed in accordance with owners' needs. In the main, warehouses</p>	<p>✓</p>

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<p>be considered include:</p> <ul style="list-style-type: none"> • set energy targets for the HVAC services based on owner cost expectations and building services expected life; • the minimum amount of plant should be operated to provide acceptable space conditions when use out of normal work hours is necessary; • providing sufficient energy metering and switching for energy management; • use separate systems to condition spaces which have different hours of use; • install optimum stop/start controls to allow the system to reduce its operation to the minimum time required to achieve the required conditions; and • ensure that the building is sealed against infiltration through windows, doors, lift shafts, and ductwork. 	<p>will not be air conditioned or heated, and will be naturally vented by the use of roof extractors or similar devices.</p> <p>Plant will be designed to operate only when necessary and will include energy metering/switching controls to reduce energy use when low occupancy occurs.</p> <p>All buildings will be appropriately sealed to reduce heat/cool air loss particularly the office components of the development.</p>	<p>complies</p>
<p>Carparks Where natural ventilation of carparks is not possible, mechanically ventilated carparks shall install CO monitors and variable speed drives to ensure that the fans will only run at full capacity when needed yet maintaining an air change rate through the carpark during periods of low usage.</p>	<p>All car parks will be open air and/or naturally ventilated.</p>	<p>✓ complies</p>
<p>Toilets</p> <ul style="list-style-type: none"> • Toilets shall be provided with a variable speed drive to the toilet exhaust system. • Occupancy sensors shall control a motorised damper in each toilet area to allow ventilation of the toilets when they are in use and close the damper in each toilet area after a set time period of no occupancy to prevent unnecessary ventilation. 	<p>Toilets will have variable speed drive exhaust systems, with occupancy sensors to control the motorised damper in each toilet area.</p> <p>Exhaust systems will be in operation only when the toilet areas are in use and automatically close after a set period of time.</p>	<p>✓ Not variable speed exhaust, but will be on sensor for exhaust + lights</p>
<p>3.4 Lighting</p>		
<p>Planning & Design</p> <ul style="list-style-type: none"> • Artificial light should only supplement natural light when required during the day and ideally be sophisticated enough to adjust to different lighting levels in different areas due to distance from windows and changing external light levels. • The extent of lighting should be relative to the use of different areas. For example high lighting levels should be provided for workstations and service areas. • Controls shall be fitted to ensure that lights are not left on when not 	<p>Artificial lighting will be required and will be of energy efficient fixture and installations. Typically up-lighting, compact fluorescent down lighting, desk lights and the like.</p> <p>Warehouses will have skylights in at least 10% of the roof area and lights will be linked to photo-electric dimming.</p> <p>Average Lighting Power Density to be used is as follows:</p> <ul style="list-style-type: none"> ▪ Offices ¼ 12 W/m² 	<p>✓ Complies TS fluro + LED</p>

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<p>required. Types of lighting control devices include time switches, photoelectric switches, time delay switches, automatic daylight controls, proximity sensors, and infra-red signallers.</p> <ul style="list-style-type: none"> Occupancy sensors shall be provided in areas which remain unoccupied for significant periods of time such as boardrooms, storerooms and toilets. 	<ul style="list-style-type: none"> Warehouse ¼ 3.5 W/m² per 100 lux <p>Controls to be fitted to ensure that lights can be powered down when left on and when not required. These controls include time switches, photoelectric switches, time delay switches, automatic daylight controls, proximity sensors, and infra-red signallers. Occupancy sensors shall also be provided in boardrooms, bathrooms and storerooms.</p>	
<p><i>Electric Lamps</i></p> <ul style="list-style-type: none"> Incandescent lamps are most appropriate for operation where the electric lighting is required only occasionally (less than 3 hours per day); dimming or frequent switching is required and the relatively short life is acceptable. Fluorescent lamps are preferred when electric lighting is required for long periods; large areas need to be lit, at low mounting heights; high luminous efficacies are required; and precise optical control is not required. Fluorescent lamps should be T8 triphasers or T5s and the low loss or electric ballasts should be used. High Intensity Discharge lamps have very high luminous efficacies; large wattage ranges from less than 100 to up to 3kW and very long life. However, they have a high initial capital cost, 5 to 10 minute delay before full light output and poor colour rendering properties. Metal halide is preferable to mercury vapour where colour is important or high pressure sodium if colour rendition is not important. 	<p>Fluorescent lamps will be used where electric lighting is required (nominally in the office areas). In warehouse areas high intensity discharge lamps will be used where fluorescent lamps are not practical.</p> <p>High intensity discharge lamps will be used in the warehouse components of the development.</p> <p>TS fluoro/or LED lights</p>	<p>✓</p>
<p><i>Emergency, Security and External Lighting</i></p> <ul style="list-style-type: none"> Emergency lighting components must comply with Australian Standard AS2293.1. External lighting can be segregated into access and security lighting, both of which cannot be activated until a photoelectric cell (PE) senses night time. External lighting (other than security) shall be solar powered. 	<p>All buildings will have emergency lighting components for egress in compliance with AS2293.1</p> <p>External lighting will be segregated into access and security lighting which will not be active until night time through the use of photoelectric cell sensors.</p> <p>External lighting (other than security lighting) will be solar powered with electric backup.</p>	<p>✓</p> <p>Complies with all. Not solar powered</p>
<p>3.5 Water</p>		
<p><i>Hot Water Heating</i></p> <ul style="list-style-type: none"> Hot water heating can be a significant greenhouse gas generator for commercial and industrial developments. Gas systems are generally better than all electric systems except heat 	<p>Hot water heating would be used in the office component (typically building kitchenettes and ablution areas) and would be gas systems solar hot water</p>	<p>Complies ✓</p>

Energy efficient TS lights

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<p>pumps and that the most efficient systems are gas-boosted solar. Further, gas systems are comparably priced with continuous supply electric systems with regard to up-front and on-going costs.</p> <ul style="list-style-type: none"> To increase efficiency, water heating systems should be positioned close to the major points of use such as the kitchen. Hot water systems should have thermostatic controls and the hot water tanks and pipes should be well insulated. 	<p>All hot water systems would have thermostatic controls with pipe work and ducting insulated. They would be located in close proximity to kitchens and change rooms/toilets.</p>	<p>Complies</p>
<p>Water Usage</p> <ul style="list-style-type: none"> Install AAA rated water efficient shower heads and water tap fittings for basins and kitchen sinks. Install dual flush toilets. Capture and reuse stormwater on-site where possible for non-potable uses such as landscaping, washing water or toilet flushing. Install appropriate irrigation systems that reduce water consumption. All developments over 1000m2 need to address the potential for re-use of stormwater on the development site and any proposed impacts on the hydrology of the surrounding locality. 	<p>Water fittings such as tap, shower and basin fittings will be AAA rated.</p> <p>All toilets to be dual flush and where possible, waterless urinals shall be installed. A rainwater harvesting tank (size to be determined) will be installed for all buildings to recycle stormwater from the roof which will be used for non-potable uses including watering of landscaping. A flood assessment has indicated that such a scheme will be beneficial in terms of reducing flooding impacts in the catchment.</p> <p>The site will utilise, as far as practicable, treated water from the Orica GTP on the BIP for non-potable uses. This will include any potential industrial uses that may have high water demands.</p> <p>Landscaping areas will be predominantly native species tolerant of local conditions. Orip irrigation systems will be used as necessary.</p> <p>The site will also incorporate water sensitive urban design (WSUD) measures including the use of GPT/trash racks on key stormwater lines. Other WSUD measures such as bio-filtration are not appropriate at this site. Groundwater extraction and remediation works will continue at the site which lower groundwater levels. The recharge of groundwater is not, therefore, appropriate at Southlands.</p>	<p>✓ waterless urinals not advised due to smell. Rainwater harvesting tank will supply water to urinals + toilets. Na-warehouse storage + distribution usage Yes yes. Groundwater extraction + treatment by Orica.</p>
3.6 Appliances		
<ul style="list-style-type: none"> The use of energy efficient electrical appliances in commercial and industrial developments can result in major energy cost savings. The energy star feature should be enabled on all office equipment, such as computers, printers, photocopiers and fax machines. Appliances which give off high degrees of heat should be separated from the main work areas. 	<p>All appliances are to be energy efficient and have enabled the energy star feature.</p> <p>Where appliances will give off high levels of heat, these will be separated from main work areas.</p> <p>Should there be a requirement, cooktops and kitchen equipment shall be energy efficient and meet industry standards.</p>	<p>✓ Complies</p>

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<ul style="list-style-type: none"> Businesses which involve food preparation and/or sales of food should use energy efficient appliances such as cook tops and refrigerators. The internal layout of shops shall ensure cooling devices such as fridges and freezers do not receive direct sunlight which would place additional load on such equipment. AAA rated water efficient dishwashers and washing machines should be installed in all new commercial and industrial developments. 	<p>Should there be a requirement, buildings that house cooling devices such as fridges and freezers will not be placed in direct sunlight, thereby minimising load.</p> <p>Where provided, AAA rated water efficient dishwashers would be installed.</p>	<p>Complies</p>
3.7 Landscaping		
<p>Landscaping can improve the thermal performance of a building through seasonal variations in solar access, shade and shadows, providing wind breaks and channeling or deflecting breezes. Possible design solutions to maximise thermal performance of a building through landscaping include:</p> <ul style="list-style-type: none"> Tall trees with high, wide canopies and bare trunks will shade a roof but not walls and windows. However, care should be taken to ensure they do not grow tall enough to shade solar collectors to the south. Vines and creepers can provide an insulative effect if planted close to a building. Select plantings with low maintenance and low water consumption. Street tree species should be selected in accordance with Council's Street Tree Register to provide summer shading while not impeding solar access to dwellings in winter. Deciduous trees to the north, east and west will shade the building in summer and help keep it cool. In winter, without leaves, deciduous trees will allow sunshine to warm the building. There are potential conflicts between the principles of ESD, biodiversity and the use of non-indigenous deciduous trees which also require managing of leaf drop issues. Consult Council's Parks Department for guidance on landscaping issues. Install a tap timer and drip irrigation system for watering the garden rather than using a hose or a sprinkler. 	<p>Landscaping will include a palette of native trees, shrubs and groundcovers that will be designed to enhance the development as well as providing thermal protection. These will also be tolerant of local conditions.</p> <p>Where practical, areas will be landscaped to provide natural shading and provide wind breaks and channelling.</p> <p>The use of trees and hedges will be provided where suitable.</p> <p>Low maintenance and low water consuming vegetation will be used for all landscaped areas in order to minimise water usage. Predominant use of native species endemic to the area.</p> <p>Street trees will be in accordance with Councils street tree register and provide summer shading.</p> <p>All irrigation systems to be timer controlled drip irrigation.</p>	<p>✓ Complies</p>