SECTION 22

ECOLOGICAL SUSTAINABLE DESIGN

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Version	Date	Authors	Summary of Changes
	02/07/2015	Manager, Environment, Manager, Infrastructure Services and external Consultants	First Edition
V1	10/07/2018	Manager, Infrastructure Services	2018 general review updates

22.0 ECOLOGICAL SUSTAINABLE DESIGN

This document is a sub-section of the James Cook University (JCU) Design Guidelines and is not to be read in isolation. Consultants and Contractors are required to comply with all sections of the JCU Design Guidelines.

22.1 Approvals Required during Design

Approval shall be obtained from the Estate Directorate, Deputy Director, Planning and Development for:

- Any changes to, or deviations from these requirements,
- Applicable to for construction works valued at greater than AUD$1,000,000 or where changes are made to more than 50% of a building or site and where these requirements will not be applied, and
- Specific project targets that align with the ESD Principles and campus wide ESD targets at SD

Approval shall be obtained from the Estate Directorate, Manager, Asset Strategy and Maintenance for:

- project specific building energy study derived from the Building Energy Model in DD.

22.2 Introduction

Ecologically Sustainable Design (ESD) Guidelines enable James Cook University (JCU) to ensure holistic principles are applied, and whole-of-life impacts are considered, to deliver more positive and lifecycle-focused outcomes, for staff, students, the wider community and the environment on which we depend. The Guidelines also enable JCU to strengthen its position as a leader in sustainable property development and design in the region.

The processes needed to achieve sustainable design, material selection and construction are no different to those required to achieve any other aspect of good design. They rely on an understanding of the issues, an ability to respond to the site, climate and client requirements, and a wider understanding of the regulatory context and technical options. Sustainable design advice has the potential to create substantial on-going cost savings, increase staff and student productivity, reduce environmental impacts and increase educational outcomes, whilst meeting JCU's wider sustainability vision.

Buildings shall be designed to minimise water consumption, energy use and operating costs without reducing accommodation standards, occupant health safety or comfort. Sustainability shall be integrated into all phases of the design process using an approach which balances social, economic and environmental factors. This philosophy should be maintained throughout the entire design and construction process.

The directives within this section must be applied for construction works valued at greater than AUD$1,000,000 or where changes are made to more than 50% of a building or site, unless a written exception/concession from the Deputy Director – Planning and Development via the JCU Project Manager, is obtained prior during the initial project phase.

22.2.1 Green Rating Tools for the property sector

There are a variety of green rating tools for development, design, construction and operations available and many can provide benefits to property owners. A single system is not mandated for JCU property developments. However, Principal Contractors are encouraged to seek a rating for new buildings where a particular tool meets the project's needs, to encourage and keep aligned with industry best practice.

Where a rating is sought, the following minimum levels are encouraged.

- Green Star "Design & As-Built" (GBCA) or equivalent: This signifies 'Australian Excellence' in ecologically sustainable design and/or construction. The Green Star rating tools can be accessed at www.gbca.org.au
- 5 Star Australian Excellence (National best practice)
- LEED New Construction 2009: Gold (National best practice)
- NABERS Energy (for office buildings, hotels, data centres or similar): 4.5 Star (Property Council of Australia A Grade property standard representing National best practice)

Note that research to date indicates, that targeting the highest rating available is not necessarily going to provide a significantly greater environmental, economic, social or financial benefit. However, previous maintenance or performance issues, experienced with existing installations, are not repeated.

22.2.2 Setting ESD Targets

Each project is different so specific targets that align with the ESD Principles and campus wide ESD targets are to be developed and submitted for approval Deputy Director – Planning and Development via the JCU Project Manager prior to Design Development.

22.2.3 Independent Sustainability Advice

JCU may engage an independent sustainability consultant on all new or large projects, to ensure all sustainability, technology and cost reduction opportunities are considered and that advice, independent of the architects and services engineers, is available.

22.2.4 Initiatives

New buildings should include a minimum of two distinct design features which indicate to regular occupants and visitors how the building relates to its cultural or ecological context and creates sustainable outcomes. These could include visible technologies, exposed services, green infrastructure or landscapes, integration of art, or incorporation of local materials. Utility consumption information display is not considered a highly valuable initiative for this purpose.

22.3 Design Approvals

Irrespective of directions received from JCU, the Consultant remains fully responsible for the design solution developed.

The ESD requirements for each building and infrastructure service are required to be produced by the Principal Consultant and each engineering consultant, to be included in reports as detailed below and in each services section.

22.3.1 Planning Report

The Planning report will give a list of high level opportunities for the project. The report will contain:

- Typical ESD Functional Design Brief.
- Completed ESD Compliance table.
- Services opportunities for each engineering discipline.

22.3.2 Schematic Design (SD) Report / Design Review

The Schematic Design (SD) report will give a high level understanding to University of the requirements for the project. The report will contain:

- Initial ESD Functional Design Brief
- Completed ESD Compliance table.
- Initial Site Environmental Management Plan (SEMP) as required in Section 21 - including waste minimisation plan, and giving consideration to - appropriate durability in product specification for construction - during the detail design phase.
- Specific targets that align with the ESD Principles and campus wide ESD targets, developed and submitted for approval. These to be approved by the Deputy Director – Planning and Development before DD commences.
- Services opportunities for each engineering discipline.
- For all major capital works projects including refurbishments (such as a whole floor of an existing building), a project specific building energy study derived from the Building Energy Model is to be prepared during the schematic design stage and must be provided to the Manager, Asset Strategy and Maintenance for comment and approval in DD.

22.3.3 Developed Design (DD) Report / Design Review

The Developed Design (SD) report will give a detailed understanding to University of the requirements for the project. The report will contain:

- Final ESD Functional Design Brief
- Completed ESD Compliance table.
- Site Environmental Management Plan (SEMP) including waste minimisation plan giving:
  - product optimisation and collection of wasted materials during construction.
  - a collection plan for consumable and durable materials in the operation phase.
  - a plan for adaptable reuse and deconstruction at End of Life.
- Services opportunities for each engineering discipline.

22.3.4 Construction Contract Documents Requirements

This section will contain:

- Updated Site Environmental Management Plan (SEMP) as required in Section 21 - including waste minimisation plan giving :
  - product optimisation and collection of wasted materials during construction.
  - a collection plan for consumable and durable materials in the operation phase.

- a plan for adaptable reuse and deconstruction at End of Life.

22.3.5 Sustainable Construction and Renovation Commissioning

The Construction Contractor and appropriate sub-contractors must pre-commission, commission and monitor quality for all building services in accordance with the requirements of the following:

- ASHRAE Guideline 1-1996 for Mechanical services, and
- CIBSE Commissioning Codes – A: Air Distribution Systems; B: Boilers; C: Automatic Controls; L: Lighting, M: Commissioning Management; R: Refrigerant Systems; W: Water Distribution Systems for other services; or both AIRAH DA27 and DA28.

Building handover should be in accordance with BSRIA Soft Landings.

The Contractor should be responsible for 12 months of building tuning, with a final major service after 12 months. User training must be provided for practical completion. Final maintenance training must be completed prior to issue of the final certificate of completion or 1 month prior to the completion of the defects period.

An Independent Commissioning Agent (ICA) will be appointed for all projects with a construction cost of over AUD$5,000,000.

22.3.6 Handover Requirements

This section will contain:

- Updated Site Environmental Management Plan (SEMP) as required in Section 21 - including waste minimisation plan giving :
  - Final figures for collection of wasted materials during construction.
  - a collection plan for consumable and durable materials in the operation phase.
  - a plan for adaptable reuse and deconstruction at End of Life.

22.3.7 ESD Compliance Table

This ESD Compliance table is to be completed by the Principal Contractor at all major project stages and submitted to the JCU Project Manager. Comments against each ESD Section will list compliance comments or concessions being sought. An example is given:

Name of Project:		Project Stage: ❑ Planning ❑ Schematic Design ❑ Design Development ❑ Contract Documentation ❑ Construction ❑ Post Construction
Date of Report:		
Project Manager:		
Completed by:		

Section	Requirement	Compliance Comment	Concession being sought
22.8.2 Construction and Demolition Waste	*90% of construction and demolition waste should be diverted from landfill.*	*Aiming to comply*	-

22.6 Energy including Greenhouse Gas Management	*The energy performance of a building shall be a minimum of 30% better than the overall requirements of the NCC.*	*Unable to comply in full: the external shed should not require insulation exceeding BCA requirement given its use as that would be excessive.*	*Concession requested to use BCA standard instead of ESD Guideline for all sheds for this project.*
22.3 etc			

JCU Review by:		Date:	
Role Title:		Next Step:	
Concessions Approved (IDs)			
Concessions not approved (IDs and reasons)			

22.4 Life Cycle Costing

It is imperative that all facilities are designed for sustainability, maintainability and minimised life-cycle costs.

Life-Cycle Factors are to be facilitated in the design process and life-cycle costs shall be included in the design reports above, please note that both passive and active measures are to be quantitatively analysed by a full life-cycle cost analysis which shall include capital cost, energy, water, maintenance costs and the cost implication of associated building works.

Maintenance of buildings shall incorporate durable sustainable materials with lower long-term maintenance costs details are to be to be included in the reports above.

Sustainability of building forms that maximises use of passive energy, natural lighting and ventilation while reducing energy costs is fundamental provide details in reports above.

Adaptability of buildings which make provision for future changes in layout, building services and information technology requirements is paramount provide details in reports above.

Energy management measures to be considered should include, but not be limited to, the following:

- The effect of various fenestration and building construction alternatives on both operating and capital cost of air-conditioning systems should be carefully considered and quantitative analyses undertaken.
- The use of the lowest energy lighting solutions currently available.
- The use of thermal storage strategies including full, partial and demand limiting approaches consistent with demand side management of the site. Historical data for the existing site should be considered by the design team as part of the overall assessment.
- Demand side management and automatic scheduling of hot water systems, chilled water drinking units and the like.
- Use of energy recovery from exhaust and still air systems by means of heat exchanger based enthalpy recovery systems or other technologies as appropriate.

- Use of occupancy sensor detectors to control air-conditioning system operation and lighting for spaces with intermittent use.

- Full analysis of low energy solutions to achieve high level Relative Humidity (RH) control in areas requiring direct control over space RH levels

Any recommendations should have an appropriate payback period for consideration of incorporating in the project. In principle, sustainable & energy-efficient initiatives are most likely to be adopted where they can be supported by positive fully tested life-cycle cost analysis and payback periods of less than 5 years.

The cumulative cost of energy consumption over the life of the building, is second only to staffing costs. Consequently energy management techniques should take into account the minimisation of kW demand during daylight hours, as well as the total kWh consumed.

22.5 Building Form

Refer Section 6 Architecture and Section 7 Building Envelope, of these Design Guidelines.

All occupied buildings shall be thermally insulated to a performance standard at least 20% higher than the National Construction Code requirement.

All learning spaces shall have access to daylight, with a minimum 2% daylight factor achieved across a minimum of 60% of the floor plate (when modelled with a uniform design sky).

All laboratory spaces shall have access to daylight unless prohibited by statutory and safety requirements.

All administration spaces shall have access to daylight with a minimum 2.5% daylight factor achieved across 60% of the floor plate (when modelled with a uniform design sky). A minimum of 60% of the office spaces shall have a view to the outside.

Buildings used for teaching should provide different types of spaces to allow indoor or covered outdoor teaching.

All learning and office spaces shall provide a glare free environment through the use of external shading devices such that no direct sunlight is present in the working plan for 80% of learning hours. Where this is impractical for all seasons (for example, on north elevation during the winter months) preference shall be given to the use of external green shading or tree plantings to provide solar control, with internal manually operated blinds provided as a secondary control measure.

All roof coverings shall be light in colour (reflective) to minimise the heat island effect and heat impacts on buildings. A Solar Reflective Index (SRI) value of greater than 75 is preferable. North, east and west walls should also avoid dark colours for similar reasons. Buildings should not block access to, nor diminish the quality of fresh air, sunlight, and natural waterways for any member of society or adjacent developments.

22.6 Energy including Greenhouse Gas Management

JCU buildings must be energy efficient, that is:

- buildings are to be equipped with efficient equipment and materials appropriate for the location and conditions,

- buildings are to provide amenities and services appropriate to the building's intended use, and

- buildings will be operated in such a manner as to have a low energy use compared to other, similar buildings.

The energy performance of a building shall be a minimum of 30% better than the overall requirements of the National Construction Code, when modelled using the BCA Part J, JV3 Methodology.

The energy consumption of any building shall not exceed 650MJ/m^2 Gross Floor Area per annum when modelled in accordance with BCA Part J. The Greenhouse gas emissions footprint of any building relating to the building energy use shall not exceed 168kg CO2/m^2 Gross Floor Area per annum.

22.6.1 Heating, Ventilation, and Air Conditioning (HVAC)

Refer to Guideline Section 20 for Mechanical Service requirements, especially sections on passive energy efficiency, heat recovery and free cooling.

Overall system efficiency should be considered when selecting a system. All HVAC units shall have an energy star rating within one star of the maximum available rating at the time of purchase.

Outside air should be used to provide free cooling where practical (economy cycle or partial economy cycle). For larger areas CO_2 sensors should be installed to reduce outside air quantities when the outside air temperature is unacceptable and when inside air quality will not be compromised.

Where possible a floating set-point or seasonal thermostat settings should be introduced to reduce energy consumption.

All HVAC refrigerants must have an Ozone Depletion Potential (ODP) of zero.

Thermal comfort achieved by the combined effects of the HVAC system and the facade shall be modelled in accordance with ISO 7730 and a minimum Predicted Mean Vote (PMV) range of +1/-1 shall be achieved. This would indicate that 90% of the occupants may be comfortable in the environment provided.

22.6.2 Lighting

Refer to Section 25 Electrical Services.

Employ best practice system designs that moderate energy consumption from start up to operation, through to end of life.

To reduce transport costs and wait times, light fittings and equipment should be able to be sourced from a reputable and reliable local supplier.

22.6.2.1 External Lighting

Employ the following strategies to reduce the negative impacts of light pollution on the external habitat, fauna and neighbouring areas:

The external lighting design must comply with AS 4282 ‘Control of the Obtrusive Effects of Outdoor Lighting’.

Consider employing lighting systems that a facility manager can modify or select from a range of predetermined illumination conditions to predetermined time requirements and/or performance requirements. Consider employing systems that sense and react to activity rather than operate continuously.

22.6.2.2 Internal Lighting

Natural light should be prioritised where possible. Employ lighting systems and arrangements that allow natural light to be used in lieu of artificial light when external ambient sources can provide sufficient lighting levels.

Seek to provide separate lighting circuits near windows and skylights.

Consider providing windows and skylights to provide access daylight, however ensure solar heat gain and glare is not excessive given the purpose of the space.

Place sensors for lighting circuits near windows and skylights to enable artificial light to be minimised when daylight is sufficient, or ensure all internal office lighting systems are provided with full daylight control which automate dimming and reduce power consumption.

All lights shall be visibly flicker free.

Common areas (including open plan offices, teaching spaces, lunch rooms, toilets, foyers and corridors) shall be controlled based on occupancy. Localised light switches are acceptable for individual offices.

22.6.3 Metering and Monitoring

Refer to Section 25 Electrical Services.

Energy and Water metering be provided to monitor the energy and water consumption of the tenant from all energy and water common uses, major uses, and sources. The metering must be provided separately for the distinct uses or floors in the project.

In a building with a large floor plate, energy meters should be provided separately for lighting consumption, and other power consumption.

The following energy uses/sources should be metered as a minimum:

- Car parks
- Chillers
- Air handling fans
- Lifts
- Common area lighting
- Common area power
- Any additional items with an energy use greater than 20kVA.
- Any renewable energy generated
- Any reticulated gas supply
- Mains electricity supply to each building.

Consider selecting small areas in larger complex buildings, to metering and then display the energy use of specific equipment and/or spaces, to promote positive energy consumption awareness and behaviour change of occupants.

22.6.4 Renewable Energy

A minimum of 10% of the building energy use should be provided by on-site renewable energy generation systems and roof space should be designed to allow for such installations where possible.

A minimum of 70% of the available roof area should be capable of supporting solar photovoltaic electricity generation. In such cases, the building electrical infrastructure shall be capable of direct connection to solar photovoltaic roof systems either provided at construction, or installed at a later date.

22.7 Water

Refer to Guideline Section 24 Hydraulic Services and Section 29 Wet Fire Services.

Water is valuable and finite resource. Reducing, capturing and recycling water can provide on-going infrastructure, maintenance and cost savings in conducive climates and where such infrastructure is cost effective.

Potable water use has a significant cost, and therefore low cost measures to reduce water consumption or use alternative sources such as efficient fittings, bore (noting bore water used on Cairns campus attracts payment), condensate, rain, recycled or storm water should be investigated.

Where rainfall is not sufficient (for the majority of the year) to warrant the cost of rainwater tanks and supporting infrastructure, avoid rain water systems that will be underutilised for most of their lives.

Recycled water (purple) pipe should be installed in all new buildings in preparation for recycled water use in future years.

22.7.1 Water Harvesting and Reuse

Refer to Guideline Section 24 Hydraulic Services, Section 29 Wet Fire Services and Section 32 Civils.

Rainwater or recycled water should be supplied to all toilets for flushing, and all site irrigation requirements.

Consider capturing air conditioning condensate so it can be reused within the building for non-potable purposes, or irrigation. Refer to legislative requirements for treatment requirements; currently condensate must be treated if it is to be used for toilet flushing or similar, but treatment is not required if it is being sent to stormwater or irrigation systems.

22.7.2 Water Efficiency

Refer to Guideline Section 24 Hydraulic Services and Section 29 Wet Fire Services.

All water fittings used shall be within 1 Star of the highest available WELS Star rating, as measured using AS/NZS6400:2005 Water-efficient products - Rating and labelling.

Laboratory equipment cooling systems should include 100% recirculation of cooling water. No once-through cooling systems to be utilised.

The following water uses should be metered as a minimum:

- Fire system water
- Irrigation systems
- Recycled water supply
- Mains water supply to each building.

22.8 Resource Efficiency and Waste

22.8.1 Waste Management Plan

As detailed in Section 21 Environment, contractors must submit a waste minimisation plan as part of their Site Environmental Management Plan (SEMP), explaining how materials will be optimised in each project phase:

- Design Phase; including the consideration of appropriate durability in product specification.
- Construction Phase; including product optimisation and collected of wasted materials.
- Operation Phase; including a collection plan for consumable and durable materials.

- End of Life Phase; including a plan for adaptable reuse and deconstruction.

Designs must ensure waste and recycling can be stored in an external storage area that is accessible to collection vehicles.

95% of all waste should be recycled. Recycling facilities should be provided for the waste streams: Glass, Plastic, Metals, Green Waste, Office supplies, including ink cartridges.

22.8.2 Construction and Demolition Waste

90% of construction and demolition waste should be diverted from landfill.

The Principal Contractor is required to retain waste records and regularly submit Waste Reports to the JCU Environmental Manager via the JCU Project Manager, stating the total amount (by mass) of waste generated and the percentage re-used or recycled.

22.9 Sustainable Materials Selection

22.9.1 Red List

Building Projects cannot contain any of the materials or chemicals established in the Red List as produced by the International Living Future Institute. This list will be updated as new research on chemical toxicity and health and environmental impacts emerge. Therefore contractors and project teams are encouraged to periodically review.

22.9.2 VOC Levels

All furniture, fittings and materials used in the building and fabric of the buildings, including paints, sealants, adhesives, walls, ceilings and flooring coverings shall be specified with the lowest possible VOC level. These requirements are detailed in Sections 9 through 16.

Furthermore, all carpets must also not exceed the following emissions limits:

Total VOC limit:	0.5 mg/m² per hour
4-PC (4-Phenylcuclohexene):	0.05 mg/m² per hour

22.9.3 Composite Wood Products

All engineered wood products shall have low formaldehyde emission levels or no composite wood products used. Low formaldehyde-emitting wood products should be used, such as those that meet the Australian Standards for formaldehyde emission limits (E0 and E1). The primary control measure for occupational exposure is elimination of the source of exposure.

22.9.4 Steel

At least 95% of all reinforcing bar and mesh meets or exceeds 500MPa strength grade, and at least 60% of all reinforcing steel is produced using energy-reducing processes in its manufacture (measured by average mass by steel maker annually).

Reinforcing steel includes reinforcing bar and mesh used in concrete reinforcement in the building structure. This includes steel in situ, stressed, and pre-cast concrete applications. Refer to Guideline Section 19 Structural.

22.9.5 Timber

At least 95% (by cost) of all timber used in the building and construction works should be certified by a forest certification scheme that meets the Green Building Council of Australia's (GBCA) 'Essential'

criteria for forest certification, such as Australian Forest Standard (AFS) or Forest Stewardship Council (FSC); or is from a reused source; or is sourced from a combination of both.

Any certified timber used in the project is supplied in accordance with the Chain of Custody (CoC) rules of the respective forest certification scheme e.g. relevant CoC certificates or invoices including a relevant CoC code or serial number. Refer to Guideline Section 19 Structural.

22.9.6 Concrete

At least 30% of the concrete in the cement used in the project will be reduced by replacing concrete with substitute materials such as fly ash, recycled aggregate, hemp (hempcrete), or wood chimps (durisol). The reduction will be measured by mass across all concrete used in the project compared to the reference case. For paths and non-structural walls, preference should be given to using the University's own recycled-plastic fibre-reinforced concrete product. Refer to Guideline Section 19 Structural and Section 32 Civil.

22.9.7 PVC

At least 90% of all common uses of PVC in the project are either PVC products sourced from manufacturers which meet the GBCA Best Practice Guidelines for PVC in the Built Environment; OR are products that do not contain PVC.

Refer to Guideline Section 24 Hydraulic Services and Section 29 Wet Fire Services.

22.9.8 Insulation

All thermal insulation used in the project is to have an Ozone Depleting Potential (ODP) of zero in both their manufacturer and composition.

22.9.9 Furniture

Refer to Section 13 Furniture and Fittings.

Consider the following environmental credentials in furniture selection:

- An approved Eco-rating*
- Eco Preferred Content >20% by mass
- Durability >15 Years
- Product Stewardship
- ISO 14001:2004 certified manufacturing process covering waste minimisation, energy, emissions and waste minimisation.
- Modular in Design
- Designed for disassembly

or be reused (from another premises where it was previously installed or from a second-hand retailer).

Approved environmental product ratings include the following Product Certification Schemes:

- Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS) v1.2
-

Ecospecifier GreenTag GreenRate v3.1

- Australasian Furnishing Research and Development Institute, Sustainability Standard for Commercial Furniture - AFRDI Standard 150
- Good Environmental Choice Australia (GECA), including six standards
- The Institute for Market Transformation to Sustainability (MTS) Sustainable Materials Rating Technology standard version 4.0 - SMaRT 4.0

22.9.10 Appliances

Refer to Section 13 Furniture and Fittings.

Energy appliances (fridges, TVs, computers etc.) shall be within 1 Star of the highest available Star rating available under the Australian Government's "Energy Rating" labelling system at the time of purchase.

Water appliances (dishwashers, etc.) shall be within 1 Star of the highest available Star rating under the Australian Government's Water Efficient Labelling Scheme (WELS) at the time of purchase.

22.9.11 Indoor Air Quality

Refer to Section 20 Mechanical Services.

Indoor air quality impacts occupant productivity and health and equipment so the following methods should be employed:

- Minimise entry of outdoor pollutants by locating the ventilation system away from potential outdoor contaminants (petrol fumes, etc.) and designing them to minimise the entry of pollutants.
- Provide a means to distribute high quality air evenly throughout interior spaces and avoid uneven temperatures and the stratification of air within a particular volume.
- Avoid introducing bad air from nearby facilities, equipment and utility areas including from food preparation areas, photocopying and high volume printers and other production equipment.
- Avoid discomfort by placing workstations, activities and operational functions directly into areas where external solar gains can be experienced without adequate control devices or systems in place.
- Select materials that minimise the risk of air born pollutants and that when any alteration work or repairs are undertaken which may introduce any emissions such as those from paints and the application of sealants, cleaning operations such as steam cleaning are done at times to avoid absorption and latter contamination of the work place. Pay particular attention to the ventilation requirements of such activities and arrange these via the appropriate services manager.

22.10 Sustainable Information and Communications Technology (ICT)

Refer to Sections 26 Communications, 27 AV Standards and 36 Special Requirements for Videoconference facilities.

Preference office equipment that is Energy Star compliant or similar, and uses little power on standby-power where possible.

Select printers that allow the following:

- Double sided printing and scanning.
- Long life printing drums and toner cartridges.
- Toner or ink cartridges that can be refilled.
- Toner or ink-saving modes, such as draft, black and white only as defaults or simple options.
- Manual energy saving button and programmable power management features
- Multifunction devices.
- Products that offer emissions certificates compliant with ECMA-328 (reduced toxic emissions).

Select efficient computers:

- Prioritise laptops over desktop computers as they use less power, where use of the device is minimal and WHS concerns can be addressed.
- Choose LED or LCD monitors as they typically consume less power.
- Choose those with the ability to be automatically powered down when not in use for a long time period or add power sensing and shut-off devices where possible.

Incorporate videoconferencing facilities into all new office fitouts to reduce the need for travel.

22.11 Biodiversity

Refer Section 31 Landscape.

Every building shall be provided with a shaded and landscaped community and staff break out space of a minimum of 15sqm in area, where such a space is not directly adjacent to the building.

The building should include a minimum of three distinct, overt features which visually educate the visitors to the building in the area of the environment or sustainability. These could include visible technologies, exposed services, or very overt building features or materials. Display screens are not considered acceptable for this purpose although their provision for information purposes is still encouraged.

The building facade shall be designed to minimise bird strikes. Highly reflective glass and surfaces shall be avoided. For further guidance on designing buildings to avoid bird strikes refer to the Bird-Safe Building Guidelines published by New York City Audubon:

https://www.nycaudubon.org/our-work/conservation/project-safe-flight/bird-friendly-building-design

22.12 Transport

Buildings that are regularly occupied shall include facilities to encourage the use of more sustainable transport options such as walking, cycling and public transport. Covered and secure facilities for cyclists including bike racks/compounds/containers, showers and change facilities shall be provided at a rate of one bike rack and locker per full time staff member, and one shower per 5 full time staff members. Enough covered bike racks shall be provided to enable a minimum of 50% of all students to store their bikes under cover.