

## Document History

Document Creator	Document Owner	Approval Date
Facilities Coordinator	Associate Director: Operations	06/01/2006

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v1.0	06/01/2006		Document created
V2.0	07/05/2020	Wayne Shore	Major revision

## Purpose

The aim of these *Environmental Sustainability Guidelines* is to ensure that the future development of UniSA campuses is based on environmentally sustainable principles.

The guidelines establish the principles which should be used to develop performance objectives for the following activities:

- Master planning and urban design
- New building work (internal and external)
- Refurbishment works
- Furniture, fittings, finishes and equipment.

## Amendments

The guidelines shall be reviewed and amended to adopt new practices as they are developed and at the time amendments are made to statutory regulations.

## Process

The following process shall be used to ensure environmental sustainability is addressed in each project:

- *Environmental Sustainability Guidelines* will be issued to all project teams by the Project Manager.
- The Principal Consultant, as part of the project team, is responsible for addressing sustainability issues in each project. The Principal Consultant will liaise with the Project Manager to determine the extent of the application of the *Environmental Sustainability Guidelines*.
- The Principal Consultant, as part of the project team, is responsible for monitoring the Contractor's compliance on site with Waste Management Plans and Environmental Management Plans.

## Environmental Management

Consideration shall be given to the appropriateness of alternatives to development such as the 'no development' option. Where appropriate, evaluate site and local ecosystems using structured Environmental Impact Assessment Processes.

For projects over \$1 million, the project team shall be responsible for preparing and adopting Environmental Management Plans through all phases of the project.

For projects over \$0.5 million, the Contractor shall be responsible for preparing and adopting a Waste Management Plan for the construction process. Reference should also be made to the criteria of local councils which establish when Waste Management Plans are required.

## Recycle Buildings, Use Existing Infrastructure

Assess thoroughly the opportunities for reuse of existing facilities and the long-term viability of new facility proposals as a first option. Select and use appropriate assessment procedures such as economic appraisals, value management and master-planning.

Assess the heritage significance of proposed sites and engage services of heritage consultants as required to guide the project.

## Maximise Life Cycle and Future Adaptability of Building

Design for ease of future adaptability taking into account design and planning principles for durability, versatility, access, redundancy, simplicity and upgradeability.

## Protect and Enhance the Site

Preserve and protect the physical viability of natural ecosystems by ensuring, where possible, systems are retained intact, uninterrupted and unified. Seek to provide wildlife corridors between fragmented ecosystems in co-operation with neighbouring properties. Re-establish the widest possible range of indigenous plant and animal communities, in appropriate habitats, to restore the site to its potential diversity of species.

Site the building for minimum impact on ecosystems by minimising cut and fill and avoiding removal of mature trees. Preserve appropriate existing landscape features where possible as a first option.

Minimise the use of chemicals (pesticides, herbicides and fertilizers) by designing for diversity, careful species selection and using thoroughly researched planting details and specifications. Protect the water quality of adjacent environments during construction by effective erosion and run-off controls.

## Design and Build Energy Efficient Buildings

Minimise energy demand by adopting passive design solutions as a priority.

Optimise energy outcomes by considering and selecting design options based on lowest life cycle cost. Where life cycle costs are within 10% of each other, select the option with the lowest greenhouse gas emissions.

Minimise energy demand by taking maximum advantage of site selection and planning, by:

- Giving preference, if possible, to a site with suitable shape, orientation and topography that allows building design and placement to optimise passive attributes.
- Locating the building with due consideration to orientation, solar gains, daylight access, overshadowing within and outside the site, while also meeting functional needs.
- Minimising energy requirements by optimising building design, while also meeting functional needs, by means such as:
  - Selecting building form that best provides for daylight access. Avoid causing undesirable overshadowing within and outside the site.
  - Orientating building to optimise solar control. Generally, preferred orientation is an east-west long axis for ease of controlling solar gains through north and south facing windows, to maximise daylight opportunities, and to minimise solar loads on east and west elevations.
  - Planning layout of internal spaces to maximise opportunities for and to fully exploit passive design measures such as daylighting strategies and passive heating from controlled solar access. Minimise effects of undesirable heat gains by arranging 'buffer zones' between the source and the occupied zone: for example, locating service cores, stores, plant rooms or toilets on western side of building.
  - Optimising thermal resistance of building envelope to optimise heat gain or loss, and to minimise consequential thermal discomfort and cooling / heating energy use.
  - Maximising use of local resources, where possible, to reduce transportation energy.

## Optimise Energy Consumption

Minimise energy consumption by optimising the engineering services design. As a priority, integrate engineering services to gain maximum benefit from the passive attributes of the building, e.g. artificial lighting and daylight.

Engineering services design should include:

- Dividing building into zones according to function and operational needs, cooling and heating load profiles, occupancy patterns and densities, out-of-hours use, and local emissions.
- Selecting system types, e.g. central plant or distributed discrete plant, combination ambient-task lighting or general lighting, most appropriate for zones and the building as a whole.
- Selecting control systems most appropriate for zones, engineering services or systems, and building as a whole, ranging from simple local controls, e.g. local switches, time switches, occupancy sensors, to fully integrated building management and control systems (BMCS), to ensure optimum operating efficiency and minimum wastage from unnecessary operation.
- Providing metering and monitoring systems to a level commensurate with complexity of building, as energy management tools to ensure efficient building operation.

- Designing lighting systems to ensure optimum efficiency under all conditions of building's expected usage. Maximise efficiency and minimise unnecessary energy use by means such as:
  - Choosing most efficient lighting system design and minimum lighting level appropriate for required application.
  - Adopting effective lighting controls to ensure optimum operating efficiency and minimum wastage from unnecessary operation, e.g. localised switches to encourage occupants' use, occupancy sensors, timers, central programmable time switches or control systems.
  - Maximising contribution of daylight to reduce use of artificial lighting.
  - Minimise unnecessary operation of external lighting by using photoelectric switches and timers, notwithstanding the requirement to provide adequate security lighting.
- Designing heating, ventilation and air conditioning (HVAC) systems to ensure optimum efficiency under all expected building operating conditions, from part load to full load conditions. Maximise efficiency and minimise unnecessary energy use by means such as:
  - Providing zones with different cooling / heating demands, operating hours or more stringent temperature / humidity requirements with separate HVAC systems.
  - Minimising conflicting cooling and heating demands and avoiding reheat systems.
  - Limiting outside air quantities to meet code and functional needs, to minimise unnecessary heating and cooling of unconditioned air.
  - Including automatic start / stop controls, e.g. after-hours switches for limited out-of-hours use, to limit unnecessary HVAC operation.
  - Including demand ventilation control, based on CO<sub>2</sub> monitoring, for spaces with high but transient occupancy.
  - Adopting energy-saving devices and systems such as variable speed drives for major components, waste heat recovery and economy cycle systems.
- Considering the use of energy cogeneration principles where these are less carbon intensive than utility energy
- Selecting most appropriate hot water units for the building. Minimise heat and energy loss by locating units close to areas of greatest demand. Recirculating pumps should be thermostatically controlled to limit unnecessary operation.
- Utilising energy-efficient lifts including intelligent controls to optimise operational efficiency against occupant movement patterns, and to minimise unnecessary travel. Destination control strategies should be considered where appropriate.
- Selecting energy efficient equipment and appliances based on their rated performance or recognised star rating scheme.

In order to manage energy consumption throughout the building lifecycle, following strategies shall be implemented:

- On completion of installation, engineering services and energy efficiency measures shall be properly commissioned and tuned to ensure they are operating as design intended.
- During building's operating life, programmed preventative maintenance shall be carried out on all systems to ensure they continue to operate efficiently.
- As part of managing building operation, energy use shall be monitored to ensure it is within acceptable limits. Any overruns will be accounted for, with corrective actions taken.
- Throughout the building life, further opportunities will be sought to improve operational efficiency, particularly when building usage changes over time.

## Make the Building Healthy

Consider the common denominators of Sick Building Syndrome holistically, including temperature and air velocity, fresh air ventilation rates, relative humidity, lighting, noise, micro-organisms, particulates, volatile organic compounds and gaseous pollutants.

Avoid the use of polluting substances by selecting low impact construction materials. Provide appropriate air filtration on all HVAC systems. Provide appropriate lighting for different uses and maximise use of daylight. Minimise unacceptable noise.

## Select Low Impact Construction Materials

Consideration is to be given to the 'cradle to grave' implications of material choices, the implications of the materials' extraction, manufacture, use and disposal.

Subject building material selections to systematic consideration of whole of life environmental impacts. Avoid the use of hazardous materials or only use them with adequate safety devices and precautions.

Impacts that should be considered are:

- Impact on natural ecosystems from which the material was extracted / grown.
- Amount of energy required in production / transportation.
- Environmental impacts generated by construction activities.
- Amount of toxic waste generated in production.
- Potential of material to be recycled.
- Amount of recycled material used in production.
- Lifespan and durability of the product.
- Effectiveness of the product.
- Any threat to human health from deterioration of the product.
- Nature of waste generated by disposal of the product.

Use recycled and recyclable building materials where available and fit-for-purpose.

## Provide High Air Quality

### Internal Air

Internal air quality shall be maximized through:

- Careful ventilation design including appropriate locations for fresh air intake, high grade air filtration and due regard to internal building divisions and configuration.
- Use local exhaust ventilation for specific indoor pollution sources such as wet areas, kitchenettes etc.
- Implementing building purge immediately prior to occupancy to reduce impact of fumes generated through off-gassing of new fittings and furniture.
- Design and maintenance which minimize risk of microbial hazards such as legionella.
- Selection of materials, furniture and fittings to minimize formaldehyde and VOC exposure.

### External Air

Minimise air pollution and emissions from buildings. Specify refrigerants and processes that minimize ozone depleting potential and greenhouse warming potential.

## Reduce Noise

Protect sites from noise pollution from local features such as traffic, industry and entertainment venues. Design site layout to separate noise generating activities from quiet activities. Minimise noise transmission from space to space within multiple-occupancy buildings. Minimise noise emitted from external equipment such as fans, air-conditioners, compressors, and from other noise generating sources.

## Optimise Light

Design and site buildings to avoid hazardous or undesirable glare to pedestrians, motorists, people using open spaces and those in other buildings.

Avoid overshadowing and visual intrusion of adjoining sites.

Design to minimise the impact of night lighting on adjacent areas and avoid the use of uncontrolled external up-lighting to minimise sky glow. Refer to the International Dark Sky Association and CIBSE Lighting Guide 6 for guidance.

## Save Water

Use water efficient equipment, e.g. toilets, taps, showers, appliances.

Design landscape to minimise water use, e.g. select plants that require minimal watering and maximise rainwater infiltration.

## Minimise Waste

Design for minimum wastage in construction and demolition by:

- Formally applying dimensional co-ordination where it will practically assist efficiency of material use, particularly for modular components and materials supplied in set sizes or dimensions or where high levels of wastage may occur.

- Giving design consideration to future ability and ease of recycling construction materials and components at time of refurbishment or completion of facility's life.
- Preparing and implementing waste management project plans during project for construction and demolition wastes. Plans should identify alternatives to landfill and describe procedures and management practices.
- Making provision in project programming for recovery, storage and transfer of re-useable materials from demolition works, including their transport from site to recycling and re-use stations.

## Renewable Energy

The design should consider options to utilize or generate sources of renewable energy and / or energy storage where appropriate and cost efficient to improve energy efficiency or reduce carbon impact.

Sources that may be considered include the following:

- Solar Photovoltaic
- Solar Thermal
- Wind
- Battery storage
- Thermal storage