Charles Sturt University

Revision 5.0

Infrastructure Design Standards

Module S10: Sustainable Building Guidelines

Division of Finance (Strategic Infrastructure)
Charles Sturt University

Document Control

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Contents

1. Introduction

1.1. Overview

The Charles Sturt University Infrastructure Design Standards (the Standards) outline the University's expectations for its built forms to achieve consistency in the quality of the design and construction of those built forms.

The Standards have been developed to provide guidance to the design team and to assist Facilities Management to drive a consistent approach to the design, construction, commissioning, handover, and operation of new capital projects to ensure the new asset is fully integrated into campus life and conforms to the University's standards and policies.

The successful integration of any new project into the day-to-day operation of campus life cannot be underestimated and is vital to ensuring the new asset provides a fully functional platform for Facilities Management clients and the University. The Standards will ensure Facilities Management is successful in supporting the University's strategic objectives now and into the future. The pitfall of viewing any new project as a standalone entity must be avoided as any new project is an extension of the existing campus.

The Standards are aligned with Charles Sturt's requisites for aesthetic appeal, life cycle maintenance and environmental sustainability, while ensuring that there is sufficient scope for innovation and technological advancements to be explored within each project.

1.2. The University

The history of Charles Sturt University dates to 1895, with the establishment of the Bathurst Experiment Farm. Formed progressively through the merge of regional institutions in south-western and western NSW, Charles Sturt was formally incorporated on 19 July 1989 under the Charles Sturt University Act 1989. As one of Australia's newer universities, Charles Sturt has been built on a tradition of excellence in teaching and research spanning more than 100 years.

With over 40,000 current students studying both on-campus and online, Charles Sturt University is the largest tertiary education institution in regional Australia. The University operates six main campuses across New South Wales in Albury-Wodonga, Bathurst, Dubbo, Orange, Port Macquarie, and Wagga Wagga, alongside specialist campuses in Canberra, Parramatta, and Goulburn. Charles Sturt University is structured around three Faculties: Arts and Education; Business, Justice and Behavioural Sciences; and Science and Health.

1.3. University Vision and Values

Charles Sturt University is committed to building skills and knowledge in its regions by offering choice and flexibility to students, while collaborating closely with industries and communities in teaching, research, and engagement. As a significant regional export industry, the University brings both strength and learning back to

its regions, positioning itself as a market-oriented institution. Its goals are to remain the dominant provider of higher education in its regions and a sector leader in flexible learning.

Charles Sturt University believes that wisdom has the power to transform communities. With perseverance and dedication, the University contributes to shaping resilient and sustainable regions for the future. Acknowledging the deep culture and insight of First Nations Australians, the University's ethos is encapsulated by the Wiradjuri phrase *yindyamarra winhanganha,* which translates to "the wisdom of respectfully knowing how to live well in a world worth living in." Through its values, Charles Sturt University fosters a welcoming community and learning environment that supports innovation, drives societal advancement, and gives back to the regions it serves.

1.4. Using the Infrastructure Design Standards

The Infrastructure Design Standards are written to advise Charles Sturt University performance requirements and expectations that exist above and beyond existing industry codes and standards.

The Infrastructure Design Standards do not repeat codes and standards.

Performance to Codes and Standards are a non-negotiable regulatory minimum of any design solution, to be determined for each project by the design team.

The Standards are to be used by all parties who are engaged in the planning, design, and construction of Charles Sturt's facilities. This includes external consultants and contractors, Charles Sturt's planners, designers, and project managers as well as faculty and office staff who may be involved in the planning, design, maintenance, or refurbishment of facilities. All projects must comply with all relevant Australian Standards, NCC, EEO as well as Local Government and Crown Land Legislation.

1.5. Modules

The Standards are divided into the following modules for ease of use, but must be considered in its entirety, regardless of specific discipline or responsibilities:

- S01 Overview and Universal Requirements
- S02 Active Transport
- S03 Acoustics
- S04 Building Management System
- S05 Electrical and Lighting
- S06 Energy Management
- S07 Ergonomics
- S08 Fire and Safety Systems
- S09 Floor and Window Coverings
- S10 Furniture
- S11 Heritage and Culture
- S12 Hydraulic

- S13 Information Technology
- S14 Irrigation
- S15 Mechanical Services
- S16 Roof Access
- S17 Termite Protection, Vermin Proofing and Pest Management
- S18 Security Systems
- S19 Signage
- **S20 Sustainable Building Guidelines**
- S21 Waste Management
- S22 Project Digital Asset and Data Requirements
- S23 Commissioning, Handover and Training

1.6. Related Documents

1.6.1. University Documents

The Standards are to be read in conjunction with the following relevant University documents, including but not limited to:

- Facilities and Premises Policy along with supporting procedures and guidelines
- Charles Sturt University Accessibility Action Plan 2020 - 2023
- Relevant operational and maintenance manuals
- Charles Sturt University Asbestos Management Plan
- Charles Sturt University Signage Guidelines
- Charles Sturt University Modern Slavery Statement
- Charles Sturt University Sustainability Statement
- Charles Sturt University Work Health and Safety Policy
- Charles Sturt University Risk Management Policy
- Charles Sturt University Resilience Policy
- Charles Sturt University Health, Safety and Wellbeing Policy

1.6.2. Federal Legislation

The planning, design and construction of each Charles Sturt University facility must fully comply with current relevant Federal legislation, including but not limited to:

- National Construction Code (NCC)
- Disability Discrimination Act 1992 (DDA)
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC)
- Work Health and Safety Act 2011

1.6.3. NSW State Legislation

The planning, design and construction of each Charles Sturt University facility must fully comply with current relevant Federal legislation, including but not limited to:

- Work Health and Safety Act 2011
- Environmental Planning and Assessment Act 1979 (EP&A Act)
- Building and Development Certifiers Act 2018
- Heritage Act 1977
- Protection of the Environment Operations Act 1997 (POEO Act)
- Design and Building Practitioners Act 2020
- State Environmental Planning Policies (SEPPs)
- Local Government Act 1993

1.6.4. Federal Regulations and Standards

- Relevant Australian or Australian/New Zealand Standards (AS/NZS)
- Safe Work Australia Model Codes of Practice
- Work Health and Safety Regulations 2011
- Disability (Access to Premises – Buildings) Standards 2010
- National Environment Protection Measures (NEPMs)

1.6.5. NSW State Regulations and Standards

- SafeWork NSW Codes of Practice
- Disability (Access to Premises – Buildings) Standards 2010
- Building and Development Certifiers Regulation 2020
- NSW Work Health and Safety Regulation 2017
- Protection of the Environment Operations (General) Regulation 2022
- NSW State Environmental Planning Policies (SEPPs)
- Fire and Rescue NSW Fire Safety Guidelines
- NSW Local Council Development Control Plans (DCPs)

1.6.6. Manufacturer Specifications and Data Sheets

All installation must be carried out in accordance with manufacturer specifications and data sheets to ensure product performance over its intended life and so as not to invalidate any warranties.

1.6.7. Project-Specific Documents

Requirements specific to a particular project, campus, or other variable, will be covered by project specific documentation, such as client briefs, specifications, and drawings. These Standards will supplement any such

project specific documentation. The Standards do not take precedence over any contract document, although they will typically be cross-referenced in such documentation.

Extracts from the Standards may be incorporated in specifications; however, it must remain the consultant's and contractor's responsibility to fully investigate the needs of the University and produce designs and documents that are entirely 'fit for purpose' and which meet the 'intent' of the project brief.

1.7. Discrepancies

The Standards outline the University's generic requirements above and beyond the above-mentioned legislation. Where the Standards outline a higher standard than within the relevant legislation, the Standards will take precedence. If any discrepancies are found between any relevant legislation, the Standards and project specific documentation, these discrepancies should be highlighted in writing to the Manager, Capital Works.

1.8. Departures

The intent of the Standards is to achieve consistency in the quality of the design and construction of the University's built forms. However, consultants and contractors are expected to propose 'best practice / state of the art' construction techniques, and introduce technological changes that support pragmatic, innovative design. In recognition of this, any departures from relevant legislation, or the Standards, if allowed, must be confirmed in writing by the Manager, Capital Works. Any departures made without such written confirmation shall be rectified at no cost to the University.

1.9. Professional Services

All projects at Charles Sturt University require the involvement of adequately skilled and experienced professionals to interpret and implement the Standards. Consultants or contractors lacking proper qualifications and licenses are not permitted to conduct any work.

1.10. Structure of Document

This document is structured into 4 sections:

Section 1 Introduction (this Section).

Section 2 General Requirements – outlines the general requirements or design philosophies adopted at Charles Sturt University.

Section 3 Supporting Documentation – Legislation, Standards, Codes of Practice, University Policies, and other applicable technical references.

Section 4 Specifications (if applicable) – materials specifications and/or preferred lists for materials, processes or equipment used by Charles Sturt University.

2. General Requirements

2.1. Overview

CSU is committed to integrating sustainability practices into all facets of its organisation.

It is a part of the University's core strengths and business as a university.

These guidelines have been developed to facilitate implementation of ecological sustainable design (ESD) initiatives into the University's built environment. They are not intended to replace the level of initiative, competence and care expected of project managers and designers nor are they intended to be prescriptive in their application. They are however intended to communicate a firm direction, expectations and intended process.

Buildings generally are a major contributor to the world's greenhouse gas emissions and global energy consumption. In Australia commercial and residential buildings contribute to more than 20 percent of Australia's total greenhouse gas emissions.

CSU has a significant and diverse property portfolio across six core campuses located in the regional cities of New South Wales. CSU is not a property developer but will typically own a building from design and construction, through operation, refurbishment, and re-purposing to demolition. Consequently, CSU will benefit from the whole-of-life efficiencies of its building stock. As such CSU should be mindful of the impact of the operating cost of these assets. The design and construct phase sets the footprint for these operating costs.

CSU's commitment to integrating sustainability into the University's built environment through sustainable building design, construct and operation not only demonstrates its corporate social responsibility but it makes good business sense.

The National Construction Code (NCC-2019) applies across the breadth of design and construct matters but does not serve as benchmark for ecological sustainable buildings. Also, the code may not apply to all the Classes of buildings within a university precinct.

Significant changes to the NCC are in development including energy, health, and amenity goals (Refer "Trajectory for low energy buildings", COAG Energy Council, Dec 2018). The NCC Volume 1, Section J specifically applies to energy efficiency and was amended in July 2020 and is due for further amendment in 2022.

Sustainable building design and construct does not result in the least expensive capital solution, but a realistic assessment should be undertaken on the whole of the life cycle costs. Buildings and fit outs should not be extravagant, and each project should represent value for money.

The development of these guidelines draws heavily on best practice in the sector, including the following:

- Green Building Council of Australia's (GBCA) Green Star Design & As Built tool
- National Australian Built Environment Rating System (NABERS) operational rating tools

In adopting and applying the GBCA Green Star and NABERS ratings a sound basis is provided to ensure CSU exceeds the NCC.

It is also a recognition that assessment and measurement are steps towards better environmental management of our buildings and assists to ensure that our designs are continually translating into better performing buildings.

However, these processes are not without issue as they can be complicated by the relevance of the building classification type and by the costs associated with achieving formal certifications. There is an argument for example, that the direct cost of achieving the formal certification of Green Star has no environmental benefit. It is expected that current guidance standards contained herein will be superseded as they become part of the normal design.

These Guidelines are structured to be reviewed and amended periodically to adopt new guidance's for the purpose of driving continuous improvement in CSU's ecological sustainable designs.

2.2. Application

The following procedures shall be adopted to promote and ensure ecologically sustainable design initiatives are addressed across all new build and refurbishment projects. CSU undertakes a broad range of projects including new builds, extensions, refurbishments, and other small structures. It is acknowledged that for a number of types of building applications and types of scope-of-works the Green Star Rating system and NABERS rating systems are not applicable. These guidelines are structured to accommodate the breadth of CSU development projects. The classification of projects by scale is set as guidance. Every project should target to exceed these general ESD requirements. Maintenance works are not covered under these requirements.

2.3. Project Category

The application of the ESD initiatives in general is applicable across the breadth of all build projects including

eg carparks, recreational facilities as well as new buildings and major building developments. However, the opportunity for achievement of the scope of ESD initiatives will depend on the project type and scale. There is also a practical minimum scale that the application of this process is deemed to benefit. This is considered in the broad classification of projects defined by scale as follows:

Flagship Projects

All new build projects exceeding $20 million or 4,000 m2 or that are deemed a "Flagship" development are targeted to achieve a formal 6 Star Green Star Design & As Built Certification.

Major Project

All new building and large extension/refurbishment projects that exceed $1 million or exceed 1,000 m2 or have a significant impact on the thermal envelope but are not a Flagship development are targeted to achieve 5 Star Green Star Design & As Built but not formally certified.

Minor Works

Minor works typically involve small refurbishments or building upgrades to existing facilities to improve amenity or to re-purpose a space. Applies to all projects greater than $50,000 and not exceeding $1 million or 1,000 m2.

2.4. Process

The purpose of the process as outlined below is to promote a rigour of inclusion of the ESD initiatives in the design and construct phase of each project.

Flagship Developments.

All Flagship Developments will appoint a suitably qualified ESD Consultancy to the project who will be primarily responsible for achieving the 6 Star Green Star Design & As Built Certification. The ESD Aspects within this Guideline are closely aligned to the Green Star Design & As Built rating framework. The Consultancy will reference the ESD Initiatives within each aspect as a reference to drive the scoring for achieving the 6 Star Green Rating.

Major Projects

All Major Projects will appoint a suitably qualified ESD Consultant to the project who will be primarily responsible for achieving a 5 Star Green Star Design & As Built rating, internally assessed. The ESD Aspects within this Guideline are closely aligned to the Green Star Design & As Built rating framework. The Consultancy will reference the ESD Initiatives within each Aspect as a reference to drive the scoring for achieving the 5 Star Green Rating. A comprehensive sustainability compliance report, a report noting compliance with the attainment of an equivalent 5 Star Green Star As Built rating (internally assessed) and these Guidelines, is to be issued for the project. The Sustainability Consultancy will report to the Project Manager.

Minor Works.

A Sustainability Advocate, a person familiar with the Green Star Design As Built rating framework and these Guidelines and otherwise independent of the project, will be appointed to each project. The Sustainability Advocate in conjunction with the Project Manager will identify a set of ESD Initiatives as a project opportunity and develop a program of sustainability reviews with the project manager, commensurate with the project size and complexity, to monitor and track the achievement of the opportunities. This should form the basis of an ESD compliance report to be prepared by the Sustainability Advocate. The initial goal setting should be timely to identify and set specific ESD Initiatives in accordance with these Guidelines. On completion of the project the Sustainability Advocate will audit the project for achievement against the ESD compliance report. (A simple ESD Compliance Scorecard is provided as an example – Refer Appendix 1).

2.5. ASD Projects

These guidelines have been developed around a framework of ESD Aspects. These aspects are subject areas aligned to the Green Star Rating categories but also the framework is modelled along the results of the Sustainability Vision workshop for the development of the Port Macquarie Campus. Hence the defined Aspects

should best reflect a category of ESD Initiatives most relevant and material to Charles Sturt. The ESD Initiatives are defined below (Refer ESD Initiatives Defined). The specific ESD Initiatives within each Aspect should be regarded as “alive and evolving” and should be reviewed annually to maintain both the relevance of this document and as a driver to implement the evolving “best practice” of sustainability in CSU’s design and construct assets.

The framework of ESD Aspects has been developed to maintain a consistency of approach in future revisions of the ESD Initiatives in this evolving “space”. The framework is defined below. The content of each Aspect is generally defined by the Aspect title and the descriptors under each aspect as follows:

1. Sustainable Project Management

- This aspect identifies and challenges
- How the project is delivered
- What is delivered
- Ecological sensitivities of the development
- Management and assessment of on-going building performance
- Interface with people and the environment

2. Indoor Environment Quality

- Improved user comfort, health and well-being
- Facilitation of academic performance
- General amenity of the space

3. Energy Efficiency and Carbon (Clean Energy)

- Facades, building shape and orientation
- Equipment efficiencies
- Onsite renewable generation
- Low carbon technologies
- Carbon Neutrality
- 2030 Energy Strategy / GONG
- Reduced Peak Electrical Demand

4. Water

- Reduced potable water demand
- Water efficient systems
- Harvesting of rainwater
- Water re-use

5. Sustainable Transport

- Public transport
- Electric Vehicles
- Walkable / Cycle-able neighbourhoods

6. Sustainable Materials

- Low emission materials
- Reduce, Reuse and Recycling
- Local and Responsible Sourcing

7. Landscape

- Taking care of the hydrologic cycle – reduce potential adverse impacts
- Improve the ecological value post construction

8. Community

- Diversity of users
- Encourage community interaction.

2.6. Project Applicable ESD Initiatives

The extent to which the ESD Initiatives can be applied to CSU projects is dependent on the scale of the project, the nature of the work being undertaken, the project funding and the commitment of the project team. The ESD initiatives defined below are a current set of priority Initiatives for targeting. The following table specifies the required ESD initiatives to be taken into account in the sustainable design and construct process as informed by the scale of the project.

Initiative		**Applicable Projects**		
Item	**Description**	**Flagship**	**Major**	**Minor**
1	Sustainable Project Management	√	√	√
1.1	Project Scope	√	√	√
1.1.1	No Development Option	√	√	√
1.1.2	Strategic Critical Buildings	√	√	√
1.1.3	Heritage	√	√	√
1.1.4	Protect the Site's Natural Ecosystem	√	√	√
1.2	Environment and Waste Management Plan	√	√	√
1.3	Modelling and Benchmarking	√	√	
1.4	Metering and Monitoring	√	√	
1.5	Sustainability Information Display	√	√	
1.6	Building Occupant Guide	√	√	
2	Indoor Environment Quality	√	√	√
2.1	Hazardous Building Materials	√	√	√
2.2	Indoor Air Quality – CO2	√	√	
2.3	Indoor Air Quality – VOCs	√	√	√
2.4	Microbial Hazards	√	√	√
2.5	Noise	√	√	√
2.6	Light	√	√	

2.7	Shading	√	√	
3	Energy Efficiency & Carbon (Clean Energy)	√	√	√
3.1	Building Envelope	√	√	
3.2	Power Factor	√	√	
3.3	Solar Arrays	√	√	
3.4	Internal Lighting	√	√	√
3.5	Energy Efficient Equipment	√	√	√
3.6	HVAC	√	√	√
4	Transport	√	√	
4.1	Provision for Electric Vehicles	√	√	
4.2	Cyclist Facilities	√	√	
5	Water	√	√	√
5.1	Town (Potable) Water	√	√	
5.2	Fittings and Fixtures	√	√	√
5.3	Rainwater	√	√	
5.4	Grey Water	√	√	
5.5	Water Sub-metering	√	√	√
6	Sustainable Construction Materials	√	√	√
6.1	Low Impact Construction Material	√	√	√
6.2	Furniture Standards	√	√	√
6.3	Sustainable Timber	√	√	√
6.4	Low Emission VOC Materials.	√	√	√
6.5	Supply Chain	√	√	√
7	Landscape	√	√	√
7.1	Stormwater	√	√	√
7.2	Topsoil	√	√	√
7.3	Vegetation	√	√	√
8	Community	√	√	
8.1	Recreation Areas	√	√	
8.2	External Teaching and Learning Spaces	√	√	
8.3	Permeability to Local Community	√	√	

2.7. ESD Initiatives Defined

The following ESD Initiatives are current and relevant to the CSU business.

Sustainable Project Management

Applicable Works: Flagship, Major, Minor. This category relates to what and how the project is delivered and impacts how the facility will be operated and its performance.

- Project Scope. Applicable Works: Flagship, Major, Minor. In the scoping of the building project, all projects need to give due consideration to the following aspects.
- No Development Option. Applicable Works: Flagship, Major, Minor Consideration should be given to appropriate alternatives to the development including the “no development” option.
    - Assess thoroughly the opportunities to re-purpose existing facilities.
    - Assess the proposed density of occupation and effective utilisation of occupied spaces.

Strategic Critical Buildings

Applicable Works: Flagship, Major

- Strategic critical buildings are broadly defined as buildings which potentially fit into the highest category (High) of the Strategic Building Index (SBI).
- Such buildings are expected to be part of the continuing future stock of our building assets and as such should be critically reviewed in respect of climate change adaptation.
- Such buildings should:
    - Identify significant climate-change risks and develop appropriate mitigation measures. (eg Milder climates could be expected to reduce the durability of building material; safeguard building against seepage and damage; Ensure HVAC Systems minimise the contribution to GHGE and are appropriate and adequate including capable for more climate extremes).
    - Identify opportunities for the project to increase the ability of the future building occupants and asset managers to cope with the impact of climate change.

Heritage

Applicable Works: Flagship, Major, Minor

- Assess the heritage significance of proposed sites and implement preservation or risk reduction programs where appropriate. Ensure there is no loss of significant heritage items.

Protect the Natural Ecosystem

Applicable Works: Flagship, Major, Minor

Site any new build or other projects involving significant earthworks to minimise the impact on existing ecosystems.

- Minimise the cut and fill.
- Preserve and protect the physical viability of natural ecosystems by ensuring systems remain intact, uninterrupted, and unified.
- Provide wildlife corridors.
- Re-establish indigenous plant and animal communities.
- Provide site remediation activities including regeneration and re-vegetation.
- Practice good hygiene practices to avoid the introduction of pest species.

Environment and Waste Management

Applicable Works: Flagship, Major, Minor

All projects must prepare and implement an environmental management plan (EMP) for the construction process. For Flagship and Major Projects an EMP must meet the NSW Government's nominated standard to manage environmental performance, conditions and impacts arising from demolition, excavation and construction.

The NSW Government's guidelines can be access at:

https://www.info.buy.nsw.gov.au/resources/construction/environmental-management-guidelines-for-construction

For Minor Projects a simplified template may be used which will need to be prepared by the Project Manager in consultation with the Sustainability Advocate.

Construction Waste Management (WMP). The EMP must include a construction waste management plan (WMP). The WMP must minimise the amount of construction waste going to disposal and must target and include:

- 90% of Demolition waste to be re-used or recycled.
- Provide waste reports to ensure targets are met.
- Address sedimentation and erosion to prevent pollution of adjacent sites.
- As far as possible re-use construction waste on-site eg aggregate for footpaths.

Waste must be separated into the following sub-classes:

- Concrete, Brick and asphalt
- Timber
- Metal
- Cardboard & Paper
- Comingled recyclables
- Clean Fill

For Flagship and Major Projects the Head Contractor must have ISO 14001 Environmental Management System Accreditation.

Evaluate site and local eco-systems and where sensitive systems are suspected, prepare an Environmental Impact Assessment using a structured process.

Modelling and Benchmarking Requirements

Applicable Works: Flagship, Major

Modelling and benchmarking informs the design process and is fundamentally important to designing a high-performance building. Additionally, it provides a ranking and focus for benchmarking, monitoring and targeting future energy performance improvements. The following modelling is required to be completed in accordance with the most recent version of the relevant Green Star rating tool:

- Thermal Performance of building envelope

- Daylight modelling
- Shading analysis

The following NABERS Benchmarking is to be completed (Certified rating not required). New designs should commit to achieve a particular NABERS rating when operational and use this target to inform design decisions. The actual rating should be assessed as close as possible to its first full year of operation by the ESD Consultancy.

- NABERS Energy Measures the energy efficiency of the building. The Whole of building Energy rating should be used.
- NABERS Water Measures the amount of water used and recycled within a building. The Whole of building water rating should be used.

Metering and Monitoring

Applicable Works: Flagship, Major

To enable monitoring of building performance meters must be installed and connected to the BMIS system. A utility meter is to be installed to measure the whole of the building utility consumption including:

- Grid Electricity (Whole of Bld and MSSB sub-metering)
- Solar Electricity
- Gas
- Potable Water
- Grey Water (where applicable)

Sustainability Information Display

Applicable Projects: Flagship, Major

An environmental information display must be located at the main entrance of the building in a clearly visible and accessible location that clearly communicates building attributes and performance that serves as an environmental learning resource to all building users and visitors.

The performance targets for energy and water consumption and GHGE should be provided.

The display should be in-line with the overall enterprise-level approach (Refer Operational Standards - BMIS) intelligently designed and display other information of relevant use including eg weather, schedule of events, items of applicable to the university and regional information etc.

Building Occupant Guide

Applicable Works: Flagship, Major

A Building Owner Guide which describes the features and operation which the building occupants (owners) use to operate the day-to-day the internal building environment. The documentation must be readily and clearly understood and include a Summary Building Operating Guide. In addition, the Summary Building Operations

are to be posted at key touch-points in the buildings. The Building Owner Guide should contain the following information:

- ESD Features
- Building
    - Heating, Cooling, Ventilation
    - Lighting

2.8. Indoor Environment Quality (IEQ)

Applicable Projects: Flagship, Major, Minor

IEQ refers to the quality of a building's environment as experienced by its occupants. It includes factors such as indoor air quality (IAQ), lighting (daylight and electrical), acoustics, thermal environment and occupant comfort. IAQ also includes CO2 and VOCs. IEQ has a significant impact on the health and wellbeing of building occupants. Increasingly studies are showing that IEQ parameters can significantly impact productivity and students' learning performance. Also studies have reported the detection of significant situational cognitive impairment from impurities (VOCs and carbon dioxide) in the air breathed by test subjects. One of the ESD challenges is to reduce energy consumption and carbon footprint while achieving optimal indoor environmental conditions.

Hazardous Building Materials

Applicable Projects: Flagship, Major, Minor

No projects are permitted to install hazardous building materials or components that contain hazardous building materials. Hazardous building materials are identified as Asbestos, Lead and PCBs. In addition, Synthetic Mineral Fibre (respirable fibres) should be avoided where possible

Indoor Air Quality - CO2

Applicable Projects: Flagship, Major

Humans are the main indoor source of carbon dioxide in most buildings.

Indoor CO2 levels are an indicator of the adequacy of (outdoor) air ventilation relative to indoor occupant density and metabolic activity. Outdoor CO2 levels are usually 350-400ppm whereas maximum indoor CO2 level considered acceptable is 1000ppm.

While research is continuing to develop, it has been shown that CO2 has a big impact on cognitive performance even at 1000ppm which is considered to be a healthy level in which to work.

Inadequate ventilation (high CO2 levels) may also occur if HVAC Systems are ineffective.

All buildings must comply with AS1668.2 – 1991 Mechanical Ventilation and Air Conditioning.

Monitoring of the CO2 level enables the outside air supply to be modulated indirectly based on occupancy levels.

It is recommended CO2 monitoring be put in place and appropriate system responses are activated when the CO2 levels rise above a set limit of 900 ppm for the following spaces:

i. Where Internal areas are used for the significant purpose of academic pursuit including teaching and learning spaces, libraries and academic offices

AND

ii. Where Space is naturally ventilated

OR

iii. Where space is mechanically ventilated and occupancy is high density (Ref LEEDS recommendation: Greater or equal to 25 people per 1,000 sqft. [Equivalent to 27 people per 100 sqm])

For mechanically ventilated spaces HVAC return systems should be equipped with CO2 sensors connected to the BMS System. When combined with Demand Controlled Ventilation Systems it has the dual benefit of saving energy. For naturally ventilated spaces alarm signals must indicate ventilation adjustments are required in the affected space.

Indoor Air Quality – VOCs

Applicable Projects: Flagship, Major, Minor

VOC emissions consist of a range of volatile organic compounds which are released from materials in the form of vapours due to off-gassing. The build-up of VOCs in the indoor environment has been associated with the “sick building syndrome”.

In addition to building materials (refer ESDI 6.2) common sources of VOCs include:

- Office equipment such as photocopiers and printers
- Air drawn from outside including cigarette smoke.

The primary control measure for occupational exposure to VOCs should be the elimination of the source.

- Ensure fresh Air intakes are suitably located.
- Use Local Exhaust Ventilation for specific indoor sources such as wet areas, photocopiers and printers.
- New buildings / new spaces must be ventilated before occupation.

Microbial Hazards

Applicable Works: Flagship, Major, Minor

Microbial Hazards Protect against release of microbial hazards such as legionella bacteria into ambient air by proper design and maintenance of HVAC and cooling systems. Moulds and other Allergens In areas where cellulosic materials are used and become moist mould mildew can propagate and release allergenic spores into the air within 48 hours.

Noise

Applicable Works: Flagship, Major, Minor

Provide appropriate and comfortable acoustic conditions for occupants. Minimise unacceptable noise.

- Protect sites from noise pollution from local features such as traffic, industry and entertainment venues.
- Provide screening or earth mounding to control noise.
- Design site layout to separate noise generating activities from quiet activities.
- Minimise noise emitted from external equipment such as HVAC equipment.
- Minimise noise transmission from space to space within multiple occupancy buildings.
- Minimise noise transmission from roofs.
- For Flagship and Major Projects Use DFM's preferred acoustic consultancy.

Light

Applicable Works: Flagship, Major

Well-lit spaces provide high levels of visual comfort to occupants. Also natural daylight has been demonstrated to provide productivity and wellbeing benefits to building occupants.

- Maximise the use of daylight.

To ensure the wellbeing of occupants a minimum of 70% of the floor area of all offices, teaching spaces (non-lecture theatre) and gathering spaces must achieve a Daylight Factor >2.0% (achieved at desk height - 720mm AFFL). Spaces which have a specific use that preclude the provision of daylight (eg some laboratories) need not comply.

- Provide appropriate lighting levels for various uses. (Refer to Aust. Std.)
- Minimise the use of glass on facades exposed directly to the sun.
- Provide sun-shading where glass is used.
- Avoid overshadowing and visual intrusion of adjoining site and open spaces.
- Design to minimise the impact of night lighting.
- Design and site building to minimise undesirable glare to people in adjoining spaces.

Shading

Applicable Works: Flagship, Major

To avoid unwanted heat gain and discomfort from direct glare building facades should be designed such that for 80% of the working day (8am to 6pm) there is no direct sun entry. (Any significant shortfall in this target should be noted and documented)

2.9. Energy Efficiency & Carbon (Clean Energy)

Applicable Projects: Flagship, Major, Minor

CSU is committed to a reduction in its Carbon Footprint through its Clean Energy Strategy which includes a 35% reduction in energy consumption, fully electric campuses (GONG) and energy sourced from 100% renewables by 2030. CSU is a Carbon Neutral University business.

CSU's Clean Energy Strategy drives:

- Energy Efficiency
- All services to be electrically powered – No new natural gas services or appliances.
- Use of Heat Pumps
- Use of Solar Hot Water Systems
- Extensive use of on-site renewable electrical generation.

Building Envelope

Applicable Works: Flagship, Major

The thermal performance of a building envelope has a significant and on-going impact on energy use and user comfort. Energy efficient buildings are characterised by the building's insulation, glazing performance and building sealing. The NCC Volume 1, Section J provides guidance on minimum energy efficiency requirements and should be exceeded in all aspects. In designing and building energy efficient buildings:

- Adopt Passive design solutions (exploit local climate and intrinsic properties of the design and materials)
    - Assess options for external shading and blinds – Building envelope thermal upgrades (eg insulation and air-tightness improvements)
    - Operable windows/louvres to provide natural ventilation and night purge.
    - Ceiling fans
- Optimise energy outcomes through selecting design options on the basis of lowest life cycle costs with a bias for lowest GHGE
- Minimise energy demand by taking advantage of site selection and planning by means such as siting the building with due consideration to
    - solar gains
    - daylight access
    - building form
    - building orientation

For Flagship and Major Projects targeting a Green Star Rating of 6 or 5 respectively, it is expected in every case the NCC Section J (Energy Efficiency) Standards will be exceeded. In addition to the Green Star Rating a NABERS Energy and Water rating is required.

Power Factor

Applicable Projects: Flagship, Major

All building should achieve a power Factor 0.95 or better. Buildings which are fitted with grid connected solar PV Systems should be fitted with inverters with reactive power control.

Solar Arrays

Applicable Works: Flagship, Major

All new buildings and existing buildings should be designed to be solar-ready and to maximise the potential for generation by rooftop solar energy systems. Where practical, solar energy systems will be delivered in parallel with the overall project. The targeted rating shall be set by the Manager, Sustainability

Internal Lighting

Applicable Works: Flagship, Major, Minor

Energy used for lighting can constitute upto 30% or more of total energy usage within a building. Efficient lighting systems with good control can substantially reduce this energy consumption. Lighting designs must conform to following:

- Lighting Power density
- LED Lighting should be widely used as the standard.
- Lighting designs must achieve a maintained illuminance of not greater 25% above the minimum maintained illuminance levels in Table E1 of AS1680.2.3 for 95% of all spaces.

Motion detector controls must be installed for all areas that have irregular occupation. (Irregular Occupation: If not continually occupied for more than 70% of a std. 9am to 5pm working day.)

Energy Efficient Equipment

Applicable Works: Flagship, Major, Minor

All equipment to be installed should be energy efficient. Many Electrical appliances are rated under the Energy Star Rating System. Energy Rated Appliances -Energy Rating Labelling System.

- Selected appliances must be within ½ star of the highest energy Star Rating in the equipment class (i.e. type and capacity for freezers; Place settings for dishwashers.)
- Other Goods – Not covered by Energy Rating Labelling System Selected appliances should be more efficient than that of comparable equipment that is no more than 2 years of age.

HVAC

Applicable Works: Flagship, Major, Minor

Design of the HVAC system should ensure optimum efficiency under all expected building operating conditions. To maximise efficiency and minimise unnecessary energy usage the following needs to be considered:

- No new gas appliances – heat-pump technologies to be adopted in place of gas boilers and furnaces
- Thermal Storage.

Air-conditioning is the primary culprit behind peak electricity supply problems and it is the easiest electrical load to shift. Thermal energy storage technologies have proven to substantially reduce peak demand electrical loads. The cooling load is one of the easiest electrical loads to shift because the energy can be easily stored in the form it will be used. This can be simply affected by augmenting a chiller-based cooling system with on-site thermal storage tanks storing chilled water.

- Zones with different cooling/heating demands , operating hours or specific temperature /humidity requirements should have separate HVAC Systems
- Automated control systems to implement operation of night purge and economy modes of operation.
  • All infrequently occupied spaces should be designed to automatically set back or shut down when not in use.
- Adopt energy saving devices and systems such as variable speed drives for fans and pumps and waste heat recovery to pre-heat incoming services.
- Minimise conflicting cooling and heating demands which wastes energy in simultaneous heating and cooling.
- Refrigerants

Historically refrigerants have included chemical compounds that deplete the Ozone Layer and cause Global Warming. The Montreal Protocol established a phase down schedule of these chemicals. To limit the impact of global warming specify refrigerants that have a zero global warming potential.

- Hydrochlorofluorocarbons (HCFC's).
  - HCFCs are Ozone Depleting Chemicals
  - The Montreal Protocol mandated a 100 percent phase-out of HCFCs by Jan 2020.
  - As such no new refrigeration equipment using HCFCs are to be installed in any project.
  - Where existing installed equipment is using HCFCs, it should be replaced with alternate refrigerant equipment.
- Hydrofluorocarbons (HFC's).
  - HFCs are synthetic greenhouse gases which generally have a high global warming potential. Australia's phase-down (bulk imports in cylinders) of HFCs commenced in 2018 and the endpoint will be reached in 2036 at 15% of the baseline level.
  - These gases are regulated under the Ozone Protection and Synthetic greenhouse Gas.
  - If there are no alternatives then a low GWP HFC must be specified (GWP100 < 1400).
  - While these refrigerants will continue to be long-term available, during the phase down period to 2036 there is a need to be mindful of being unduly influenced by supplier pricing incentives. Such pricing incentives for the supply of these refrigerant systems may arise because of a supplier's business purpose without appropriate regard to the phase down requirements.

2.10. Transport

Applicable Projects: Flagship, Major.

Transport infrastructure should be typically delivered as a campus wide-service. However there are services that need to be integrated into precincts or individual buildings that assist in the adoption of alternative transport options.

Provision for Electric Vehicles

Applicable Projects: Flagship, Major.

On all new developments the facilitation of the uptake of electric vehicles is required. To deliver on this requirement there should be provision for

- Electrical infrastructure to car parks to enable future parking bays with charge points
- Potential siting of car parking bays with charge points

(Preferred supplier of EV Charging equipment is EVSE Australia [evese.com.au]) 4.2 Cyclist Facilities Applicable Projects: Flagship, Major. Secure bicycle storage, change rooms, showers and lockers are to be located within reasonable proximity.

2.11. Water

Applicable Works: Flagship, Major, Minor

Water generally and specifically town (potable) water is a resource limited commodity. NSW Regional communities have been struggling through long periods of drought. NSW DPIE along with regional water service providers have been focussing on securing essential town water supplies throughout regional NSW which covers all the locations of the (core) CSU campuses. All types of water needs to be saved through the use of water efficient products. Towns water use needs to be scrutinised and consideration needs to be given to collection of rainwater and the capture and reuse of Greywater. [Refer Australian Guidelines for Water Recycling (visit recycledwater.com.au and select 'Guidelines > Australia' from the menu). Recycled water must be treated to a level where it is considered fit-for-purpose.

Town (Potable) Water

Applicable Projects: Flagship, Major.

Regional Town Water issues for consumers are primarily focussed on conservation of use as opposed to quality. [Water quality standards are generally maintained to a high degree and come under the scrutiny of NSW Health]. The following targets are aspirational consumption targets for the campuses.

All projects should set or better these as core deliverables.

- New Build Development: Benchmark consumption < 1kL/m2 GFA pa
- No town water to be used for Farm Water
- No town water to be used for irrigation where it can be avoided
- No town water to be used for evaporative heat rejection systems and single pass (once through) heat rejection systems.

(Where existing buildings are being significantly renovated the opportunity to replace evaporative cooling and single pass heat rejection systems should be considered).

Fittings and Fixtures

Applicable Projects: Flagship, Major, Minor.

The WELS rating scheme is designed to assist in the comparison and selection of water products. All sanitary fittings and fixtures are required to meet a minimum WELS rating as follows:

- Toilets – Dual Flush: WELS 4 Star
- Urinals low flush: WELS – 6 Star; or waterless
- Taps: WELS – 6 Star
- Showers: Max resultant flow of 9L/min

Rainwater

Applicable Projects: Flagship, Major

Rainwater collection is to be installed on all new build projects and used in the building to replace potable water. Make rainwater collection flushable. Rainwater collection tanks are to be sized such that a minimum of 2 months of average annual rainfall on the building can be captured and stored.

Captured rainwater is to be provided, in order of preference to:

- Toilet flushing
- Process cooling or heat rejection systems
- Irrigation.

Grey Water

Applicable Projects: Flagship, Major

On all new builds a minimum of 50% of grey water is to be captured and suitably processed. Consider UV Treatment or re-direction to landscape features or use as wash-water. Water from uses such as basins and showers can be captured (and treated) for re-use in appropriate areas in-line with the requirements of the regulators. (Refer www.sydneywater.com.au and www.health.nsw.gov.au)

Water Sub-metering

Applicable Projects: Flagship, Major, Mino

All major primary utilities and major uses of water must be individually metered.

Meters should be connected to the BMS and include local memory.

Primary utilities includes:

- Potable water
- Rainwater Supply
- Recycled grey water.

Major users of water typically includes:

- Irrigation
- Bathrooms
- Laundries
- Laboratories

2.12. Sustainable Construction Materials

Applicable Projects: Flagship, Major, Minor

Consideration must be given to:

- Implications of “cradle to grave” material choices, the implications of the materials extraction, manufacture use, disposal, and transportation and supply chain - low impact construction materials
- Low emission VOC Materials

Low Impact Construction Material

Applicable Projects: Flagship, Major, Minor

Building material selection should be based on the systematic consideration of the whole of life environmental impacts Life Cycle Assessment (LCA) Methodology. Impacts that should be considered include: – Impact on the natural ecosystems from which the material was extracted.

- Amount of energy used in its production / transportation.
- Potential of the material to be recycled and the nature of the waste from disposal of the product.
- Amount of recycled material used in production.
- Amount of (toxins) waste generated in production.
- Durability of product.
- Effectiveness of product.
- Risk to human health from deterioration of the product (including fire).
- Nature of waste.

Use Recycled and Recyclable Building material. Use recycled building materials where fit-for-purpose. This is especially applicable for non-structural concrete where recycled aggregate can be used and postconsumer plastic polymers, particularly for use in landscape applications and traffic control devices.

Furniture Standards

Applicable Projects: Flagship, Major, Minor

Minimising the environmental footprint of the product life cycle associated with office furniture is generally well covered by third Party certification organisations. Ensure suppliers and selected products are certified which should include one of the following:

- Supplier of furniture to confirm >80% by mass of the furniture is reused. Australian Furnishings Research and Development Institute (AFARDI) Standard.
- GECA – Furniture and fittings standard.
- GreenTag GreenRate Standard.

Sustainable Timber

Applicable Projects: Flagship, Major, Minor

All timber products are to be either post-consumer recycled timber or Forest Stewardship Council/Australian Forestry Standard (FSC/AFS) certified.

Do not use rainforest timber and timber from Australian high conservation forests.

Use untreated timber plantation timber wherever appropriate.

Design for timber substitutes or engineered wood products with minimal off-gassing potential.

Low Emission VOC Materials

Applicable Projects: Flagship, Major, Minor

VOC emissions consist of a range of volatile organic compounds which are released from materials in the form of vapours, due to off-gassing can build-up in the indoor environment.

Common sources of VOCs include:

- Pressed wood products (Formaldehydes off-gassing; including plywood, particle board and MDF used for panelling, shelving, laminated flooring, furniture and cabinets.
- Adhesives, caulking compounds, plastics etc.
- Floor and window coverings.
- Paints.
    - It is more likely that imported materials and products may not be manufactured to the same standards as generally expected of Australian manufacturers. Specifications of materials should be sort including quality standards testing for VOCs.
- Wood Products
    - Use only low formaldehyde –emitting wood products meeting Australian Standards for formaldehyde Emissions (E0 and E1 Standards)
- Paints and Adhesives
    - Use low VOC emitting water-based products including adhesives and paints.
- Petrochemicals.
    - Where practical avoid using petrochemical based products like plastics and vinyls.
- Insulation (and Other Building Materials)
    - Ensure building materials such as insulation and carpet (backings) are free of Chlorofluorocarbon (CFCs) and Hydrochlorofluorocarbons (HCFCs).
- Floor Coverings
    - Carpet The recommended certification is one or more of the following:
        - Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS) v1.2 (ECS Level 4 accreditation required)
        - GECA 50-2011 v2i - 'Carpets' o GreenTag GreenRate v3.14 Level A
        - General floor coverings General coverings should comply with:
            - GECA 25-2011 v2 - 'Floor Coverings'
            - GreenTag GreenRate v3.1 5 Level A.

Supply Chain

Applicable Projects: Flagship, Major, Minor

Source materials from reputable suppliers with traceable raw material components.

Consider local sourcing to minimise carbon emissions from the transport of goods.

As far as practicable ensure materials and components are ethically sourced and suppliers have demonstrated steps for the avoidance of modern slavery in their supply chains.

Favour suppliers who have Environmental Standards Certification and or are Carbon Neutral Certified.

2.13. Landscape

Applicable Projects: Flagship, Major, Minor.

Land development detrimentally impacts a site's natural eco-systems and hydrologic processes. Also with global warming many parts of Australia can be expected to experience more severe rainfall events and longer droughts.

The following principles apply:

- Natural Eco-systems
    - Protect and enhance the site's natural eco-system by ensuring the systems are retained intact, uninterrupted and unified.
    - Conserve as far as possible the indigenous plant and animal diversity and otherwise re-establish the range of indigenous plant and animal communities to restore the site's diversity of species.
- Wildlife Corridors.
    - Provide wildlife corridors between fragmented eco-systems in cooperation with neighbouring properties.
- Hydrologic Processes
    - Maintain as far as possible the natural hydrologic processes of the site (and adjacent environments).
- Mitigate the landscape impacts of drought.
    - Provide drought resilient gardens.
    - Provide drip irrigations systems if required.
- Landscape for Energy Efficiency.
    - Consider the building aspect.
    - The careful selection and planting of trees can assist to reduce energy bills.
    - Screening with trees can be used to deflect prevailing cold winter winds and provide shading in the summer.

Stormwater

Applicable Projects: Flagship, Major, Minor

Land development detrimentally impacts the hydrologic processes of the site. The intensity of rain storms is expected to increase.

- Avoid diverting rainwater directly to stormwater.
    - Minimise surface run-off through impervious areas (eg roofs and pavements). Consider the use of pervious paving and maintain stormwater quality.

    - Avoid compacting soil and minimise covering with impervious surfaces.
    - Groundwater Recharge Re-charge the groundwater through the use of
        - Swales
        - Retention ponds
        - Irrigation ponds
- Minimise the removal of natural vegetation of the site as this detrimentally impacts the hydrological process.
- Retain removed top-soil for re-use
- Stormwater Quality
    - Stormwater quality is impacted by natural forms of pollution (eg rotting leaves) and man-made contaminants (eg petroleum, pesticides and fertilisers).
    - Use structural, vegetative or managerial best management practices for its treatment.
        - Consider the removal of total suspended solids (TSS mainly sediment) through filtration by planting sedges and reed beds.
        - Consider the removal of nutrients through the use of submerged gravel wetlands, infiltration basins and detention ponds.

Topsoil

Applicable Projects: Flagship, Major, Minor

All topsoil removed during the construction process is to be managed such that it remains productive. Consider a pre-construction virgin soil condition report so that post construction soil mediation and plantings can best be tailored to the soil and environment.

To maximise the productivity of the topsoil removed during the construction process ensure that it is:

- Separated from being mixed with fill and waste.
- Protected from erosion.
- Protected from weed infestation by covering with a suitable weed free mulch.
- Returned to the soil to the top (10cm) of a natural soil substrate as soon as possible.

Vegetation

Applicable Projects: Flagship, Major

Trees

- Established trees of appropriate species and sound structure are a potential asset to any development. Mature and native trees close to the development should be mulched to increase soil porosity (increases life span and risk from falling limbs).
- Select trees for drought resilience.
- A preliminary tree assessment should be carried out at the beginning of the project. An arboriculture impact assessment should be prepared once the final layout for the project is determined.
- Measures to protect trees should comply with AS 4970: Protection of trees on development sites.

Native Species

- The landscaping (including grassed areas) of any project should focus on low maintenance and low water use (select for drought resilience) focussing on native species.
- Native plants should not require permanent irrigation.
- Maintenance may require monitoring particularly in times of drought when stressed plantings may need to be watered.

Minimal use of irrigated turf

- Grass that will require ongoing irrigation should not be considered as a landscaping treatment unless it provides specific amenity or functional purpose.

2.14. Community

Applicable Projects: Flagship, Major

The University is an academic community where social interaction should be encouraged. It should be considered a part of social sustainability of the university. Particularly in regional communities, the academic community provides a focus for extended social relationships.

Recreation Areas

Applicable Projects: Flagship, Major

Social capital is important in developing organisation cohesion. The building infrastructure can be conducive to developing social capital particularly if considered as an integral part of the design process. As such consideration should be given to tea rooms, common rooms, barbeque, and external seating areas to enable relaxation, host functions and build relationships.

External Teaching and Learning Spaces (T&LS)

Applicable Projects: Flagship, Major

Teaching outside of the formal lecture theatre / classroom in an external environment can be an effective method to promote learning. Effective external T&LS require careful consideration of landscape, vegetation, egress patterns, noise sources and emissions. Where possible they should be considered to enhance the whole of the university experience

Permeability to Local Community

Opportunities should be considered to increase the accessibility and utilisation of campuses by the surrounding community. This may include inviting access points at the campus boundary, providing connectivity to recreational paths and meeting rooms / bookable spaces that can be utilised by community groups without comprising the academic agendas or university security.

3. Supporting Documentation

These below lists are not all-inclusive and those associated with the project are responsible for identifying and complying with all standards relevant to the scope of works.

3.1. Supporting Legislation

National Construction Code of Australia (NCC) 2022

Building Code of Australia (BCA)

Work Health and Safety Act 2011 (NSW)

Work Health and Safety Regulation 2017 (NSW)

3.2. Supporting Standards

Standard Number	Standard Title
AS 1668.2	The use of ventilation and airconditioning in buildings, Part 2: Mechanical ventilation in buildings
AS1680 Series	Interior and workplace lighting
AS 4970	Protection of trees on development sites

3.3. Industry Codes of Practice

Green Building Council of Australia, Green Star Rating System

https://www.gbca.org.au/

NABERS (National Australian Built Environment Rating System)

https://www.nabers.gov.au/

3.4. University Documents

Charles Sturt University Facilities and Premises Policy

https://policy.csu.edu.au/document/view-current.php?id=465

3.5. Other Resources

NSW Government, Sustainable Buildings SEPP

https://www.planning.nsw.gov.au/policy-and-legislation/buildings/sustainable-buildings-sepp

4. Specifications

ESD Compliance Scorecard

https://cdn.csu.edu.au/__data/assets/pdf_file/0012/3799974/Sustainable-Design-and-Construct.pdf