UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA
UNIVERSITY ESTATES

ENVIRONMENTAL GUIDELINES

FOR THE BUILT ENVIRONMENT

Version 2
July 2020

TABLE OF CONTENT

1. INTRODUCTION

Environmental issues have been on the agenda of countries and organizations throughout the world for a number of decades. Recently, however, concerns over global warming, dwindling natural resources and in places like Africa, the unequal access to these resources are pushing concerns and strategy proposals upwards on the agenda of countries and institutions such as universities.

As centers of research, universities are well-placed to undertake research in areas that concerns sustainability.

At the University of the Free State there are various initiatives underway dealing with energy saving, the management of waste, and the conservation of water.

No formal planning policy for sustainability has been officially adopted by the University.

The purpose of this policy is to address issues of sustainability in the following ways:

- The policy on the environment should form part of the core values of the institution.
- The policy should address not only the built, but also the natural landscape, i.e. the campus.
- The policy should set minimum standards of performance specifications.
- The policy should seek synergy with the global university community, as well as offer leadership to the local communities in which the university is situated.

In this report, the authors will propose the following:

- How to become part of the global family of universities that have pledged their support to sustainability.
- A possible policy framework that could be officially adopted by the University after due consideration.
- A set of performance guidelines that could be implemented to promote sustainable development and management of both new and existing facilities and environments.

2. THE TALLOIRES DECLARATION

The association of university leaders for sustainable future has drawn up the Talloires Declaration, a 10-point action plan to deal with the scale and speed of environmental pollution and degradation and the depletion of natural resources. The 10-point action plan was composed in 1990 at an international conference in Talloire, France. The declaration has been signed by more than 35 universities situated in more than 40 countries.

Up to May 2012 the following South African universities have signed the declaration:

- Rhodes University
- University of Cape Town
- University of Natal
- University of Western Cape
- University of Witwatersrand

The 10-point action plan is as follows:

1. Increase awareness of environmentally sustainable development.
2. Increase an institutional culture of sustainability.
3. Educate for environmentally responsible citizenship.
4. Foster environmental literacy for all.
5. Practice institutional ecology.
6. Involve all stakeholders.
7. Collaborate for inter-disciplinary approaches.
8. Enhance capacity of primary and secondary schools.
9. Broaden service and outreach nationally and internationally.
10. Maintain the movement.

(Talloires Declaration, available at www.ulsf.org 2001, accessed on 25 May 2013).

The commitments outlined in the action plan above are completely in line with the core values of the University of the Free State. It is recognized that the Planning Policy Framework should be completely integrated with the academic strategy of the University as well as the core values that the institution subscribed to.

3. TECHNICAL GUIDELINES FOR BUILDING DESIGN AND DEVELOPMENT

The technical guidelines that are proposed in this document, are based on those developed by the Green Building Council of South Africa in their *Technical Manual Green Star SA Office Design and Office As Built Version 1 (2008).* The implementation of these guidelines will align with the credits awarded by the Green Building Council of South Africa to validate the environmental initiatives incorporated into new building work or building refurbishment on campus.

This approach should allow the University over time to have new and existing buildings on the campus accredited and even rated by the Green Building Council of South Africa. This will ensure that the University is using a recognized benchmark in their sustainability initiatives.

The requirements of the technical guidelines might not be fully applicable to each situation, and the requirements will be formalized when the project plan is formulated during the conceptual and design phases of the project.

The various categories under the technical guidelines are as follows:

3.1 Management
3.2 Indoor environmental quality
3.3 Energy
3.4 Transport
3.5 Water
3.6 Materials
3.7 Land use ecology
3.8 Emissions
3.9 Innovation

3.1 MANAGEMENT

Guidelines under this category deal with environmental principles from the inception to the operation of a building.

3.1.1 Commissioning of Building Services to Ensure Optimum Functionality

This guideline monitors the commissioning and hand-over initiatives of building systems, including HVAC, BMS, hydraulic, electrical and fire protection services.

3.1.2 Building Tuning to Ensure Optimum Occupant Comfort

In order to ensure that the optimum occupant comfort is reached throughout the year in terms of climate and in terms of occupancy are reached, monitoring of room conditions shall be done over a period of at least the first six months after commissioning by recording of temperatures and, where applicable, relative humidity. Adjustments shall be made or even re-commissioning shall be done as necessary to achieve comfort levels complying with national standards.

The responsible design engineer and contractor shall be responsible for these actions and a compliance report shall be submitted to the UFS Dept of Physical Planning at the end of the 12 month guarantee period.

3.1.3 Independent Commissioning Agent (ICA)

The UFS electrical engineer and the mechanical engineer will act as commissioning agents in order to ensure that with the design of the building and its systems the future maintenance has been considered, and that these systems are correctly commissioned before being handed over to the client.

3.1.4 Building User Guide

The management of information will ensure that building occupants will derive optimum environmental performance from the building. In order to do this, a short building users' guide shall be prepared that will contain information relevant to its users and occupants. These documents will be held in a library at Physical Planning. The users' guide should not be confused with the operation and maintenance manual.

3.1.5 Project Specific Waste Management Plan

With this guideline it is aimed to minimize the amount of construction waste going to disposal. The contractor should implement a Waste Management Plan (WMP), and he will retain records and issue quarterly reports to the building owner. The contactor will also be required to re-use or recycle a percentage (by mass) of demolition and construction waste.

3.2 INDOOR ENVIRONMENT QUALITY

These guidelines are aimed primarily at the well-being of the building occupants.

3.2.1 Ventilation Rates

Ventilation rates shall comply with SANS 10400-0:2011

The guideline promotes the use of outside air to combat the build-up of indoor pollutants. For naturally ventilated spaces, it should be demonstrated that 90% of the usable area is naturally ventilated in accordance with SANS 10400-0, with a minimum of 5% openable area.

For mechanically ventilated spaces it should be demonstrated that for 90% of the usable area, outside air is provided at a rate greater than 5 liters per second per person for offices

as stipulated in SANS 10400-0. For the University a 50% improvement above the SANS standard is required.

3.2.2 Air Distribution Effectiveness

Air distribution systems shall be designed and installed to maintain air movement inside occupied zone to comply with general acceptable engineering practice and applicable ASHRAE standards.

3.2.3 Daylight

This guideline sets out the requirements for good levels of daylight for occupants. The usable area of the building that has a daylight factor (DF) of not less than 2% at desk high level (720mm) under a uniform design sky should be at least 30% for new buildings on campus. Alternatively, at least 30% of the usable area of the building shall have a daylight illuminance (DI) of at least 250lux.

3.2.4 Daylight Glare Control

This guideline sets out requirements for the reduction of discomfort associated with glare from natural light.

Building designs must be of such a nature that it shall protect the working plane from direct sun at desk height (720mm above floor level) for 80% of standard working hours, or alternatively, where blinds or screens are fitted on glazed areas, the following criteria should be met:

- All direct sunlight penetration is omitted.
- Blinds should have a visual light transmittance of less than 10%.

It is possible that in specific circumstances daylight glare control will have to be controlled by both a fixed shading device and blinds.

3.2.5 High Frequency Ballasts

This guideline aims at the avoidance of low frequency flicker, associated with fluorescent lighting.

In order to achieve this, high frequency ballasts are to be installed in fluorescent light fittings over at least 90% of the usable area.

3.2.6 Electric Lighting Levels

Building space level must not have lighting that is over designed.

As criteria, 90% of the office usable area shall have an average maintained illuminance level of no more than 400lux, calculated at the working plane (750mm above floor level).

In specific cases, e.g. special laboratories and other types of spaces, illuminance levels shall be optimized for the specific situation.

3.2.7 External View

This guideline requires that occupants shall have views to the external environment.

The UFS requires that 60% of the usable area (offices) shall have a direct view of the outdoors or into a day lit courtyard.

3.2.8 Thermal Control

All HVAC and heating systems shall be designed and operated to maintain indoor temperatures of conditioned spaces in compliance with SANS 204:2011.

3.2.9 Hazardous Materials (in existing buildings)

To reduce health risks to building users from the presence of hazardous materials:

A hazardous materials survey should be carried out for each existing building, as defined by the South African Occupation Health & Safety Act, or other relevant legislation. The removal of asbestos, lead or polychlorinated biphenyls in accordance with the Occupational Health & Safety legislation and the Department of Water Affairs & Forestry: Minimum Requirements for Handling, Classification and Disposal of Hazardous Waste.

3.2.10 Internal Noise Levels

The provision of an internal environment in which noise levels are kept at an appropriate level.

The internal environment of buildings should not exceed the maximum internal noise levels recommended in SANS 10103:2004. As far as building services are concerned, noise from building services shall not exceed 40dB (A) eq. for general office space and 45dB (A) eq. for open plan offices > 50m². As far as the overall building is concerned, the ambient sound level shall not exceed 40dB (A) eq. for general office space and 45dB (A) eq. for open plan office space > 50m².

Noise from occupants and equipment is not included in the above analysis or measurements.

3.2.11 Volatile Organic Compounds (VOC)

The professional team shall specify interior finishes that minimize or eliminate the contribution and levels of volatile organic compounds in buildings.

Finishes used in the project should meet the following benchmarks:

- As far as paints are concerned, at least 95% of all painted surfaces shall meet the TVOC content limits as specified in the relevant ISO standard.
- Adhesives and sealants shall in 95% of the instances of an occurrence meet the TVOC content limits as laid down in the relevant ISO standard.
- Carpets, if installed, shall meet the TVOC emissions limits as outlined in the relevant ISO standard. All carpet products must comply with the following limits: total VOC limit: 0.5mg/m²/hr – 4-PC (4-vinyl phenalcyclohexene): 0.05mf/m²/hr.

3.2.12 Formaldehyde Minimization

This guideline encourages the specification of products with low formaldehyde emission levels. It is possible that no composite wood products are specified and therefore this guideline may not be applicable to every project.

The use of composite wood products with low formaldehyde emissions or containing no formaldehyde should be used. The emission levels are established by specific testing methodologies, and when a particular product is specified, the professional team will be required to furnish via the supplier the necessary documentation stating what the emission levels are.

3.2.13 Exhaust Riser

As per the requirements of SANS 10400.

3.2.14 Environmental Tobacco Smoke

The University of the Free State has a no smoking policy inside all its buildings. As part of the signage contract, the necessary signage to indicate the non-smoking status of the building shall be provided.

3.3 ENERGY

The overall energy performance of all infrastructure projects on the campus of the University of the Free State shall be guided by SANS 204:2011: Energy Efficiency in Buildings. This is a conditional requirement.

Bloemfontein, in terms of SANS 204, is situated in the climate zone known as Zone 1 (cold interior). Therefore all calculations for projects on the campuses of the University of the Free State (Main Campus, South Campus and Qwa-Qwa Campus) shall utilize data and criteria that are referred to in the Zone 1 Climate zone in SANS 204.

Should there be an overlap between the technical guidelines and the requirements of SANS 204, the SANS standard will be considered the minimum, with the stated requirement in the guideline to be the University's preferred criteria. See the requirements at the end of this section.

3.3.1 Green House Gas Emissions

Requirements to minimize Green House Gas Emissions associated with operational energy consumption:

The predicted green house gas emission of a building may be calculated using the Green Building Council of South Africa's protocol in which points are determined by an energy calculator on a scale between 0 and 20, where 0 points is for the baseline office, constructed in the same location to the requirements of SANS 204, and 20 points for a Nett zero operating emissions building.

The University aims at a 5 – 10% improvement in carbon emissions over the SANS 204 notional building.

3.3.2 Energy Sub-Metering

This guideline requires the installation of energy sub-metering to monitor on-going management of energy consumption.

It is required that the electrical engineer will be able to demonstrate that sub-metering is provided for substantive energy uses within the building, i.e. all energy uses of 100kVa or more. Furthermore, there should be an effective mechanism for monitoring energy consumption. Sub-metering should be provided separately for lighting and for power on each floor. There should also be an effective mechanism for monitoring energy consumption data from all energy sub-meters.

3.3.3 Lighting Power Density

Designs that provide artificial lighting with minimum energy consumption must be encouraged.

It should be demonstrated that the lighting power densities for 95% of the usable area at 750mm above finished floor level meets the criterion of energy use of 2.5W/m² per 100Lux. A default maintenance factor of 0.8 is also required. The above requirement could be slightly adjusted according to the type of building.

3.3.4 Lighting Zoning

This guideline requires that the lighting design offers greater flexibility for light switching so that only areas that are occupied are lit. In order to attain this requirement, all individual or enclosed spaces should be individually switched, and the size of individually switched lighting zones should not exceed 100m² for 95% of the usable area. Furthermore, switching should be clearly labelled and be readily accessible by building occupants.

Motion occupancy sensors must be employed, with the proviso that a manual override switch is available. Daylight sensors for lighting, is also encouraged.

3.3.5 Peak Energy Demand Reduction

The design and implementation of the electrical system should reduce peak demand on the energy supply infrastructure.

Systems shall be connected to the UFS Johnson Controls BMS to enable load control by means of computerized load shedding and load rolling procedures.

The design of the system should be such that the peak and average demand does not exceed 40%.

Design strategies include, but are not limited to:

- Distributed energy systems
- Co-generation
- Micro turbines
- Photovoltaic (with battery storage)
- Fuel cells
- Energy and thermal storage systems
- Batteries
- Ice storage, and
- Phase change materials.

3.3.6 Buy-in by Occupants

The buy-in from building occupants is vital to the success of the sustainability programme. Not only students and management, but especially faculty and staff should support and execute the various programmes and operating procedures contained in the Policy.

Induction and ongoing education of building occupants should be part of the general induction programmes relating to teaching, university values, etc.

3.3.7 Requirements Based On SANS 204:2011 (Edition 1)

3.3.7.1 Site Orientation

Optimal orientation for buildings on the University of the campuses of the UFS, is true north ± 15°.

3.3.7.2 Building Orientation

Building should, where feasible, face north and spaces requiring less fenestration, utility spaces, toilets, etc. could be used on the east and west façades to act as buffers against solar heat gain. Square deep plans should be avoided, and plan layouts that would allow and encourage natural ventilation should be given preference.

If it is not possible to orientate the plan due north, e.g. as in the case of an infill project, alternative strategies should be employed such as creating courtyards, bay windows on the east and west façades that face north and so on.

3.3.7.3 Building Design

Energy efficiency performance requirements shall be satisfied by adhering to the minimum standards of SANS 204, as well as the guidelines given in the rest of this document. Where possible, the building design should exceed the minimum standards by 5 – 10% or as agreed with the project design team.

For Climate Zone 1, the maximum energy demand should not exceed 80VA/m² (see Table 1 SANS 204:201).

The maximum annual consumption per building classification for academic buildings in Climate Zone 1 should not exceed 420kWh/m² (see Table 2 SANS 204:2011).

Energy demand and annual energy consumption for other types of buildings, e.g. residential accommodation could be based on actual statistics collected on campus. In all probability, demand and consumption will be slightly higher than for typical offices and other educational spaces.

- **Floors**

  Where buildings are constructed with a concrete slab-on-ground, the floor slab shall have under-slab insulation with an R-value of not less than 1 (50mm thick high density polystyrene foam).

- **External Walls**

  External walls shall be, unless otherwise instructed, double brick wall-type with a 50mm cavity to take high density polystyrene foam. The R-value of the wall should be at least 1+10%.

  For offices and institutional buildings in Climatic Zone 1, the minimum *CR*-value in hour for external walling should be 80 hours minimum. With a 50mm cavity with insulation, a double brick wall could have a *CR*-value of 130 hours (see Table 4 SANS 204:2011).

- **Fenestration**

  The aggregate conductance in solar heat gain of the glazing in each storey shall not exceed the values calculated in terms of Table 5 (SANS 204:2011).

  The aggregate air-conditioning energy value attributable to the value shall not exceed the allowance obtained by means of the energy index in Table 7 (SANS 204:2011).

- **Shading**

  Shading devices have been covered under indoor environment quality (Guidelines 4 & 5), and it should be noted here that shading devices should preferably be a permanent feature of the structure.

  External shading devices such as shutters, blinds, vertical or horizontal building screens with blades, battens or slats shall be discussed with Physical Planning prior to being specified.

- **Roof Assemblies**

  Thermal insulation should have a minimum thickness of 50mm such as Factorylite, with an R-value of 1.28.

3.3.7.4 Building Sealing

- **Building Envelope**

  The construction of the building envelope to minimize air leakage should be actively pursued. Note the technical guideline under Management (Guideline 8: Testing for Air Tightness).

3.3.7.5 Services

- **Lighting and Power**

  Note under the Technical Guidelines (Guideline 7: Electric Lighting Levels), under Energy, (Technical Guideline 3: Lighting Power Density and Technical Guideline 4: Lighting Zoning).

- **Hot Water Services**

  A minimum of 50% by volume of the Annual Average Hot Water Heating requirements shall be provided by means other than electrical resistance heating including, but not limited to, solar heating, heat pumps and heat recovery from other systems or processes. The appropriate system shall be discussed with Physical Planning and other engineering specialists that are involved in the campus infrastructure.

  According to Table 12 (SANS 204:2011), the maximum energy demand and energy consumption for places of instruction are 10kW/m² and 25kWh/m² and for offices 17kWh/m² and 42.5kWh/m² respectively. The University typically has a combination of these types of buildings and energy demand and consumption will probably range between these two parameters. Design teams should strive after lowering the demand and consumption by between 5 – 10%.

3.3.7.6 Mechanical Ventilation and Air Conditioning

- **General**

Note also the various guidelines on mechanical ventilation and air conditioning (Management, see Guidelines 2 & 3, Indoor Environment Quality, Guidelines 1, 2, 3, 9, 10, 12, 15 & 16, Water: Guideline 4, Emissions: Guidelines 1, 2, 3 & 8).

3.4 TRANSPORT

3.4.1 Car Parking

This guideline encourages on-campus commuters to use alternative modes of transportation. The following requirements are associated with this guideline:

- Provide safe and suitable pedestrian access to the building.
- Provide secure area for bicycle parking.
- The University may consider the use of decentralized parking areas.

3.4.2 Cyclist Facility

This guideline aims to increase and facilitate the use of bicycles by students and staff on the main campus.

Secure bicycle storage for 3% of the building staff (based on 1 person per 15m² of usable area) should be provided.

3.4.3 Local Connectivity

To encourage and consider the location of new developments on the campus in such a way that they are within easy reach of the critical facilities, such as academic spaces, Student Center, and the Library.

The pedestrian walkways should be developed and expanded along with new developments. The furthest residential accommodation from the library is approximately 800m (10 – 15 minutes walking time).

Access for persons with disabilities has been addressed by means of a design proposal that will be implemented in a forthcoming financial year.

3.5 WATER

3.5.1 Occupant Amenity Water

Requirements to reduce potable water consumption by building occupants, must be indicated.

The aim is to reduce the use of potable water for sanitary use.

3.5.2 Water Meters

For offices and academic buildings, one water meter per building should be provided. For student accommodation, one water meter per residence or one per complex, if applicable.

All new buildings shall have at least one water meter that can be electronically connected with the BMS to enable remote monitoring. In the case of residences separate meters shall be installed for hot and cold water.

3.5.3 Landscape Irrigation

This guideline obligates designers to incorporate requirements into the design that will reduce the use of potable water for landscape irrigation.

It is the aim of the UFS to reduce potable water consumption for landscape irrigation. Furthermore, the University aims to use indigenous plants to support the “water wise” initiative.

3.5.4 Heat Rejection Water

A design that reduces potable water consumption from heat rejection systems, is required.

Where applicable, potable water consumption by heat rejection systems should be reduced by 50%.

The use of non-chemical dosing (such as ionization UV treatment, etc.) will conserve water as it avoids more frequent flushing of cooling tower water systems.

3.6 MATERIALS

The basic principles adhered to under this category are the reduction of the amount of natural resources used, the re-use and recycle of materials when and wherever possible.

3.6.1 Building Re-use

This guideline requires that existing buildings be recycled and re-used, rather than the construction of new facilities.

In the case of buildings older than 60 years, the heritage dimension of the project should be borne in mind.

3.6.2 Re-use Materials

The above-mentioned encourages designs that prolong the useful life of existing products and materials.

In this instance, examples of re-useable materials include, but are not limited to, bricks, windows, cladding, precast concrete panels, flooring, doors, furniture and other office equipment.

3.6.3 Shell and Core or Integrated Fit-Out

Fit-out of facilities for different uses on campus should be coordinated beforehand.

The coordination of the needs and requirements of building users with the available budget should be established as early on as possible. The removal of materials and/or construction that have to be removed because the needs of building occupants have changed or were not taken into account originally, leads to a wastage of material.

3.6.4 Concrete

With this guideline the reduction of embodied energy and resource depletion through the use of concrete are encouraged.

The reduction overall, of the use of Portland cement in concrete should be strived after. The cement should be replaced with industrial waste products or oversized aggregate.

Furthermore, at least 10% of the aggregate used in concrete should be recycled, and no natural aggregates shall be used for non-structural uses, e.g. the building base courses, sub-grade to parking areas and footpaths and backfilling to service trenches, kerbs and gutters.

If the concrete used on the project is less than 1% of the value of the total contract, then this requirement is not applicable.

3.6.5 Steel

This guideline requires the reduction in embodied energy and resource depletion associated with the reduced use of virgin steel.

In both the cases of steel-framed buildings and reinforced concrete structures, the aim should be to utilize recycled steel.

If the material cost of the steel represents less than 1% of the project cost, this requirement is not applicable.

3.6.6 PVC Minimization

The aim is to promote the reduction in use of poly vinyl chloride (PVC) products in campus buildings.

Alternatives that could be considered:

- **Pipes:** Vitrified clay and high-density polyethylene pipes.
- **Electrical cables:** Polyethylene insulation and rubber sheathed cables are available.
- **Electrical conduits:** Polyethylene and steel are alternatives to PVC.
- **Floor coverings:** Rubber and composite floor coverings which do not include PVC.
- **Blinds:** Blinds could be fabricated with fabric, glass fiber weaves, wood and aluminium.
- **Window framing:** Alternatives include, aluminium, steel and fiberglass.
- **Cladding:** Alternatives include metal cladding systems, and concrete or masonry systems, fiber cement sheeting.

3.6.7 Sustainable Timber

This guideline enforces the specification of re-used timber products or timber that has been certified environmentally-responsible forest management practices.

The use of timber products should include re-used timber, post-consumer recycled timber or Forest Stewardship Council (FSC) certified timber.

If the material costs of the timber represent less than 0.1% of the project's total cost, then this guideline is not applicable.

3.7 LAND USE AND ECOLOGY

3.7.1 Location of Development

The campuses of the University of the Free State have tracts of open land, and although they might be situated within the development parameters of their various municipalities, the local site ecology will have to be taken into account. Furthermore, no go areas such as special green spaces, sports fields and other open spaces are designated on the campus structure plan.

3.7.2 Topsoil Protected

This guideline requires that construction practices should preserve the ecological integrity of topsoil.

Prior to the commencement of construction, the topsoil impacted on by the footprint of the building, shall be carefully removed and stockpiled for re-use after the completion of the project. Stockpiled topsoil shall be protected by a layer of vegetation if kept for longer than 3 months or otherwise covered with a material that is durable, yet permeable.

The importation of topsoil should only be considered as a last resort.

3.7.3 Re-use of Land

This guideline encourages the re-use of land that has previously been developed. On the campuses of the University of the Free State, re-use of land will often refer to infill developments.

3.7.4 Change of Ecological Value

The above encourages developments that would maintain or enhance the ecological value of their sites. With the new developments on the campuses of the University of the Free State, it is aimed to enhance the ecological value of the site beyond its previously existing state. This would mean the development and enhancement of campus open spaces by means of ecologically sensitive and sensible landscaping.

3.8 EMISSIONS

3.8.1 Legionella

All HVAC cooling towers, as well as hot water systems shall be maintained at a level to eliminate conditions conducive to the growth of legionella.

In this category the environmental impacts of a building's emissions are considered.

3.8.2 Refrigerant / Gaseous ODP

The use of refrigerants and gaseous fire suppression systems shall be in line with the phasing out time schedules for Developing Countries as per the Montreal Protocol.

3.8.3 Refrigerant Global Warming Potential (GWP)

This guideline prescribes the selection of refrigerants that reduce the potential for increased global warming as a result of the emission of refrigerants into the atmosphere.

The use of readily available refrigerants with the lowest global warming potential is a requirement.

3.8.4 Refrigerant Leaks

The UFS expects building systems to be designed in such a manner that environmental damage due to refrigerant leaks is minimized.

3.8.5 Insulant OPD

This guideline requires the selection of insulation materials that do not contribute to the long-term damage of the earth's stratospheric ozone layer.

All insulation materials used in the building project shall have no ozone depletion substances associated with the manufacture or composition of the material.

Typical materials are as follows:

- Building services insulation such as: chilled waterpipe work, refrigerant pipework, ductwork, hot and cold waterpipes and watertanks and watercylinders.
- Building fabric insulation in walls, roofs, floors, window frames, doors, cavity closers and lintels.

3.8.6 Watercourse Pollution

The aim of this guideline is to encourage developments that minimize storm water run-off to and the pollution of natural water courses.

The campuses of the University of the Free State have natural water courses associated with the topography of the particular areas.

The use of storm water retention areas such as swales and ponds could be encouraged over hard landscapes.

3.8.7 Discharge to Sewer

The UFS aims to have a 30% reduction from building outflows to the sewerage system over the next 10 years. This could be achieved by minimizing water use through efficient fittings and through the re-use of water, i.e. in a grey water system. Grey water with limited treatment from showers and hand basins may be used for irrigation, whilst high-level treatment could make the water available for toilet flushing.

3.8.8 Light Pollution

The guideline encourages developments that minimize light pollution into the night sky.

Illumination of buildings and other light sources shall not direct beams towards the sky hemisphere, without falling directly onto a non-transparent surface. Façade lighting shall not exceed 10 candelas/m². The illuminance levels of 95% of the outdoor spaces shall not exceed the minimum requirements of CIBSE LG6 (lighting guide – The Outdoor Environment).

3.8.9 Boiler and Generator Emissions

This guideline requires the use of boilers and generators that minimize harmful emissions. Gas boilers shall have NOx emissions of less than 100mg/kWh (at 0% excess 02). Furthermore, all petrol / diesel generators shall comply with Tier 3 emissions standards as defined by the United States Environmental Protection Agency (EPA) or the equivalent European Stage III A Standard.

The phasing out of existing diesel boilers will be implemented as the capital budget allows.

3.9 INNOVATION

Under this guideline particular innovations that will produce beneficial results to environmental impacts on the built environment are listed.

The innovations may, over time, become part of UFS Planning Policy.

REFERENCES

BOOKS

1. Chapman, M.P. 2006. American Places: In search of the twenty-first century campus. Westport, CT: Praeger Publishers.

2. Kenney, D.R., Dumont, R. & Kenney, G. 2005. *Mission and place: Strengthening Learning and Community through Campus Design.* Westport, CT: Praeger Publishers.

PUBLICATIONS FROM A CORPORATE BODY

1. GREEN BUILDING COUNCIL OF SOUTH AFRICA. 2008. *Technical manual, Green Star SA – Office v1.* Cape Town: Spire House.

2. SABS: SOUTH AFRICAN NATIONAL STANDARD. 2011. *Energy efficiency in buildings – SANS 204.* Pretoria: SABS Standards, Edition 1.

JOURNAL ARTICLES

1. Baird, G. 2009. Incorporating User Performance Criteria into Building Sustainability Rating Tools (BSRTs) for Buildings in Operation. *Sustainability,* p. 1069-1086, November.

2. Brinkhurst, M., Rose, P., Maurice, G., Ackerman, J.D. 2011. Achieving campus sustainability: Top-down, bottom-up, or neither? *International Journal of Sustainability in Higher Education.* 12(4), p. 338-354, March.

3. De Bonis, S., De Bonis, N. 2011. Going Green: Managing a Paperless Classroom. *US-China Education Review,* A 1, p. 83-87.

4. Di Giulio, M., Grande, R., Di Campli, E. & Di Bartolomo, S. 2010. Indoor Air Quality in University Environments. *Environ Monit Assess,* 170, p. 509-517.

5. Düzenli, T., Mumcu, S., Yilmaz, S. & Özbilen, A. 2012. Analyzing Youth's Activity Patterns in Campus Open Spaces Depending on their Personal and Social Needs. *Science & Business Media.* 19, p. 201-214, April.

6. Gow, P. 2005. How green is your campus?. *Independent School,* 64 (3), April.

7. Hassan, O.A.B. 2006. An Integrated Management Approach to Designing Sustainable Buildings. *Journal of Environmental Assessment Policy and Management,* 8(2), p. 223-251, June.

8. Jansik, D. 2008. Suck it up. *American School&University,* p. 44-46, March.

9. Johnson, L, Castleden, H. 2011. Greening the campus without grass: Using visual methods to understand and integrate student perspectives in campus landscape development and water sustainability planning. *Area,* 43 (3), p. 353-361, January.

10. Jones, N., Panoriou, E., Thiveou, K., Roumeliotis, S., Allan, S., Clark, J.R.A., Evangelinos, K.I. 2012. Investigating benefits from the implementation of Environmental Management Systems in a Greek University. *Clean Tech Environ Policy,* 14, p. 669-676, November.

11. Keller, N. 1996. NWF's Campus Ecology Programs: The Greening of Higher Ed. *National Wildlife (World Edition)* 34 (3), April/May.

12. Lawler, M. 2011. Transportation Safety Technologies Helps Miami University Reduce Engine Idling, Emissions in Campus Service Vehicles. *Regional Business News*. March.

13. Levin, H. 2006. Editorial: Indoor Environment Quality. *Building Research & Information,* 34(5), p. 433-436.

14. McClure, A. 2011. The Power of Green: Campus sustainability policies and practices that make a big impact. *University Business,* p. 63-64, June

15. McFarland, A.L., Waliczek, T.M. & Zajicek, J.M. 2010. Graduate Student Use of Campus Green Spaces and the Impact on their Perceptions of Quality of Life. *HortTechnology,* 20 (1), p. 186-192, February.

16. Parker, A. 2007. Creating a "Green" Campus. *BioScience,* 57 (4), p. 321, April.

17. Vance, E. 2007. Presidents Sign Commitment to Limit Emissions on Campuses. *Chronicle of Higher Education.* 53 (25), February.

18. Wennerstorm, S. 2008. 52 Ideas to Make Your Campus More Sustainable. *Independent School.* 67 (4), June.

19. Zhongguo, T. 2004. Establishing "Green Schools" and Enhancing Teachers and Students' Environment Awareness. *Chinese Education and Society*, 37 (3), p. 94-96, May/June.

ELECTRONIC MATERIAL

1. Hall, M., Murray, N. 2008. *Green Campus Policy Framework for the University of Cape Town.*[online]. Cape Town University. Available from: <http://www.greening.uct.ac.za/usr/sustainability/ewaste/downloads/GCPolicyFramework.pdf> [Accessed 16 May, 2013].

2. Huffpost Living. 2013. *Green Universities: 25 Of The World's Greenest Campuses*. [online] The Huffington Post Canada. Available from: <http://www.huffingtonpost.ca/2013/01/14/green-universities_n_2474391.html > [Accessed 16 May, 2013].

3. Gibberd, J. 2011. *The sustainable building assessment tool: Integrating sustainability into current design and building processes.* [online]. CSIR: Pretoria. Available from:<http://researchspace.csir.co.za/dspace/bitstream/10204/2882/1/Gibberd2_2008.pdf > [Accessed 24 May, 2013].

4. Trimble, A.R. 2009. *Green Building Standards: Harvard University.* [online]. Harvard University. Available from: <http://www.green.harvard.edu/sites/default/files/harvard_green_building_standards_november_2009_v2_.pdf> [Accessed 16 May, 2013].

5. Rhodes University, *Environmental Policy*, online. Available from: http://www.ru.ac.za/research/research/policiesandpractices/environmentalpolicy/

6. http://www.ulsf.org/programs_talloires.html> [Accessed 15 May, 2013]

7. http://www.uconn.edu/

8. http://www.ucc.ie/en/

9. http://www.northeastern.edu

ANNEXURE A: Environmental Guidelines for the Built Environment

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT/ CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.1 MANAGEMENT	3.1.1 Commissioning	5, 6	ME; EE	• Extract from the Commissioning Specification	Should indicate that commissioning shall follow the codes.	CIBSE Commissioning Codes for all services (or ASHRAE Commissioning Guideline 1-1996 for mechanical services and CIBSE Commissioning Codes for other services)
				• Programme	Commissioning period shown with milestones, as well as recording of data for at least six months after commissioning in MS Project or similar.	
				• UFS requirements for commissioning	Part of design brief provided by UFS resident engineers / technicians.	
				• Extract from M & E Specifications	At building handover the ME, EE shall provide record drawings; commissioning report and training of designated staff (provide evidence of training programme).	
				• Extract from Operations and Maintenance Manual	Describe how and by whom installation will be operated and training of building users.	

WORKSTAGES:
Stage 1: INCEPTION **Stage 2**: CONCEPT & VIABILITY **Stage 3**: DESIGN DEVELOPMENT **Stage 4**: DOCUMENTATION & PROCUREMENT
Stage 5: CONSTRUCTION **Stage 6**: CLOSE-OUT (see *www.sacapsa.com* for further details)

A: Architect **CE: Civil Engineer** **LA: Landscape Architect** **REE: Resident Electrical Engineer**
EE: Electrical Engineer **SE: Structural Engineer** **MC: Main Contractor ME: Resident Mechanical Engineer**
ME: Mechanical Engineer **QS: Quantity Surveyor** **SC: Subcontractor** **TE: Traffic Engineer**
UD/P: Urban Designer / Planner

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT/ CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.1 MANAGEMENT (Continued)	3.1.2 Building Tuning	Post-occupancy	REE; RME; EE; ME	• Project Programme	At least 6 months post-occupancy monitoring of systems to ensure optimum performance.	CIBSE Guide M
	3.1.3 Independent Commissioning Agent (ICA)	6	REE; RME	• Sign off on document and data packs produced by ME; EE	UFS electrical and mechanical engineers will act as commissioning agents.	UFS Policy
	3.1.4 Building User's Guide	6	ME; EE; A	• Reference Manual / Guide for building users	Short guide that contains information pertaining to: • Energy strategy pursued in design of building. • Energy saving targets and benchmarks. • Basic function and operation of: - Ventilation system(s) - Heating system - Cooling system - Electrical installation - Lighting - Domestic hot water. • Transport facilities, e.g. parking, access, public transport, where application. *(Continued on page 3)*	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT/ CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.1 MANAGEMENT (Continued)					Materials and Waste policy. • Materials to be recycled • Waste collection area(s).	
	3.1.5 Project Specific Waste Management Plan	5, 6	MC	• Extract from contract documentation outlining criteria for re-use / recycling of stated construction or demolition waste	Could state, e.g. that existing brickwork should be used as hardcore filling.	UFS Policy

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT/ CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.2 INDOOR ENVIRONMEN-TAL QUALITY	3.2.1 Ventilation Rates	3, 4, 5, 6	A	• Opening Area Schedule	To be shown on window schedule(s). Opening area to be expressed as a percentage of the room floor area.	SANS 10400-O 2011 SANS 10173
			ME	• Short Report indicating ventilation modes and equipment	Report to indicate schedule of spaces with modes of ventilation and type of equipment installed in each.	
			ME	• Record Drawings	Mechanical drawings for each typical mechanically ventilated space indicating areas and outside air supply rates, updated from tender drawings.	
	3.2.2 Air Distribution Effectiveness	3, 4, 5, 6	ME	• Short Report on "As Built" Design	Report to indicate compliance with acceptable engineering practice and ASHRAE Standard.	ASHRAE Standard 129-1997: *Measuring Air Change Effectiveness*
	3.2.3 Daylight	3, 4, 5, 6	EE; A; Specialist	• Daylight Modelling Report	To describe methodology in calculating DF or DI. Summary table to demonstrate that compliant spaces account for the stipulated proportion of usable area.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT/ CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.2 INDOOR ENVIRONMEN-TAL QUALITY (Continued)			A	• Elevations	Materials and finishes to be identified.	
			A	• Roof Plan	Materials and finishes to be identified. Show approximate height and external finishes of surrounding buildings.	
			A	• Site Plan	To indicate type and property of glazing used, e.g. minimum visual transmittance.	
			A	• Manufacturer's Data Sheet(s)	To show glazing system, glare control solution.	
	3.2.4 Daylight Glare Control	3, 4, 5	A	• Elevations	A graphical demonstration that at the working plane, 1.5m in from the centre of the glazing system, that point is shaded for at least 80% of standard working hours.	CIBSE (1999) *Daylighting and Window Design* IESNA (1993) *Lighting Handbook, 9th Edition, Reference and Application*

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.2 INDOOR ENVIRONMEN-TAL QUALITY (Continued)	3.2.5 High Frequency Ballast	4, 5, 6	EE	• Short Report	Identifying all luminaries used in the building with types of ballasts and quantities – to be at least installed in 955 of the usable area.	UFS Policy
			EE	• Reflected Ceiling Plans	Record drawings with the position and type of luminaries clearly indicated.	
	3.2.6 Electric Lighting Levels	4, 5, 6	EE	• Short Report	Report to indicate that 95% of the usable office area of the building has an illuminance level of not more than 400 lux. Compliance could be shown by means of calculations or measurement.	OHS Act of 1993 (Minimum lighting levels) SANS 10114-1, but not the UFS requirement of 400 lux
				• Reflected Ceiling Plans	To show illuminance levels of luminaries provided.	
	3.2.7 External View	3, 4	A	• Record Drawings (Floor Plans)	Marked-up tender drawings showing the floor plans of the building and any building within eight metres of the perimeter of the building. Vision glazing to be indicated. Glazing below 720mm or above 2400mm does not qualify.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.2 INDOOR ENVIRONMEN-TAL QUALITY (Continued)	3.2.7 Thermal Control	3, 4, 5, 6	ME	• See 3.1.2	Thermal control should promote comfort.	SANS 204:2011
	3.2.8 Hazardous Materials in Existing Buildings	-	A/ as will be determined	• Hazardous Material Survey Report	To be prepared by specialist in existing buildings when deemed necessary.	OHS Act (1993) Dept of Water Affairs and Forestry: *Minimum Requirements for Handling, Classification and Disposal of Hazardous Waste*
	3.2.10 Internal Noise Levels	6	A/ as will be determined	• Survey of external noise levels • Survey of internal noise levels	Taken over a 24-hour period during a normal working day. Measurements should be taken at every 50m² of usable area. Measurements should not include noise from occupants or equipment.	SANS 10103:2004 BS EN 150 140-4:1998 (internal measurements)

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.2 INDOOR ENVIRONMENTAL QUALITY (Continued)	3.2.11 Volatile Organic Compounds (VOCs)	4, 5, 6	A; MC; SC	• Schedule of Finishes	Schedule to nominate VOC limits in Paints, Sealants, Adhesives and Carpets.	ISO / IEC 17025
			MC; SC	• Contractor confirmation	A report that describes the application, amount, type and supplier of carpets, paints, adhesives and sealants.	
			MC	• VOC data sheet supplied by manufacturer	Data sheets to come from registered laboratory (ISO / IEC 17025).	
	3.2.12 Formaldehyde Minimisation	4, 5, 6	A; MC; SC	• Schedule of Finishes / Cupboards	Schedule should indicate where and what type of composite wood products have been specified.	ISO / IEC 17025 (Registered laboratory)
			MC	• Formaldehyde Emissions Report	To be obtained from the composite wood supplier. Emissions levels to be tested in a registered laboratory.	
			MC	• Construction Report	Report to describe the application, amount, type and supplier of composite wood products used on the project.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.2 INDOOR ENVIRONMEN-TAL QUALITY (Continued)	3.2.13 Exhaust Riser	4, 5, 6	ME	• Extract from specification and position on record drawings		SANS 10400
	3.2.14 Environmental Tobacco Smoke	Post-occupancy	Policy	• Directive from UFS management	Directive to confirm a no smoking policy in building(s).	UFS Policy
			A	• Extract from Signage Specification	"No Smoking" pictograms.	Tobacco Products Control Act (1993)

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.3 ENERGY	3.3.1 Green House Gas Emissions	3, 5, 6	Specialist	• Energy Modelling Report	This credit should be undertaken in conjunction with a specialist or the GBCSA.	SANS 203 GBCSA: Protocol for calculating predicted green house gas emissions, or ASHRAE *Advanced Energy Design Guide for Small Office Buildings* (2004) UFS Policy
	3.3.2 Energy Sub-metering	3, 5, 6 Post-occupancy	REE; EE	• Record drawings of electrical layout	Drawings to indicate reticulation "as built" with sub-metering separate for lighting and power.	
			REE	• Data survey record	Data survey should be undertaken continuously for a period not less than six months and preferably 12 months.	
	3.3.3 Lighting Power Density	3, 4, 5, 6	REE	• Short Report	Report to contain calculations to show that 95% of usable area complies with the criteria.	SANS 10400-O SANS 10114-1 (2005) SANS 101042-1 (2003) SANS 204 (2008) OHS Act (1993)

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.3 ENERGY (Continued)				• Extract from lighting specification • Confirmation from supplier	Specification to indicate lighting requirements, luminaries, lamp types and quantities. Type and quantity of fittings supplied.	
	3.3.4 Lighting Zoning	3, 4, 5, 6	REE	• Short Report • Extract from lighting specification • Record drawing of electrical installation	Report to list all separately switched zones. Specification to indicate requirement for switching and zoning. Drawings to show switches and area controlled by each switch.	See 3.3.3
	3.3.5 Peak Energy Demand Reduction	3, 4, 5, 6 Post-occupancy	EE; REE ME: RME	• Extract from the Commissioning Report • Short Report • Record Drawing of Installation	Report to indicate that the lighting system has been commissioned and operate as intended. Report to indicate compliance with UFS Johnson Controls BMS. Include extract from Commissioning Report.	SANS 10142

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.3 ENERGY (Continued)	3.3.6 Buy-in by Occupants	6; Post-occupancy	All Consultants REE; EE; ME	• Information Programme • Training Programme	Programme to outline schedule of information sessions (general). Training programme for specific building occupants with evidence of key milestones, e.g. attendance register, test results.	UFS Policy
	3.3.7 **Requirements Based on SANS 204:2011 (Edition 1)**					SANS 204 (2011)
	3.3.7.1 Site Orientation	1, 2, 3	A	• Site Plan	To indicate North and prevailing direction of wind. Verify location and site on GOOGLE EARTH photograph.	
	3.3.7.2 Building Orientation	1, 2, 3	A	• Site Plan	Show deviation of principal façade from North.	
	3.3.7.3 Building Design	1, 2, 3, 4	A	• Technical Documentation (Tender)	Documentation to show compliance with SANS 204, e.g. floors, external walls, fenestration, shading and roof assembly. Changes to be incorporated and noted on Record Drawings.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.3 ENERGY (Continued)	3.3.7.4 Building Sealing	4, 5	A; MC	• Technical Documentation	Drawing should specify on schedules that windows and doors shall minimize air leakage.	
			MC	• Confirmation by Supplier	Suppliers of aluminium doors and windows shall confirm the level of air-tightness of sealing strips around windows and doors.	
			MC; A	• Confirmation by Contractor	The contractor shall confirm that all other doors or opening sections are sealed with a rubber compressible strip by means of a schedule and tick list.	
	3.3.7.5 Services	3, 4, 5, 6				
	• Lighting and Power		EE	• See also: 3.2.3, 3.2.4, 3.2.5, 3.2.6, 3.2.7, 3.3.3, 3.3.4, 3.3.5		
	• Hot Water Services	3, 4, 5, 6	ME; A	• Elevations Record Drawings • Short Report	Elevations to show position / visibility of solar panels, compressors, etc. These items to be hidden from view. Report to describe and demonstrate the means of heating hot water. Evidence of monitoring data over at least a six month period should be provided.	SANS 10252

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.3 ENERGY (Continued)	3.3.7.6 Mechanical Ventilation and Air Conditioning	3, 4, 5, 6	ME	• See also: 3.2.1, 3.2.2, 3.2.8, 3.2.13		SANS 10400
			A	• Short Report	Report shall describe and demonstrate how alternative natural ventilation will be effected in the event of a failure of the air conditioning system.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.4 TRANSPORT	3.4.1 Car Parking	3, 4, 5	TE; A	• Short Report	Report shall indicate how the number of parking bays was calculated and if they comply with the requirements of the Local Authority and the UFS Policy.	Department of Transport and Regional Services, Motor Vehicles and the Environment
				• Technical Documentation (Record)	Showing the number, layout, entry and egress to and from the parking area. Position of bicycle parking should also be indicated.	
	3.4.2 Cyclist Facility	3, 4, 5	A	• Technical Drawings	To show layout of facility. Parking space for bicycles should be provided.	UFS Policy
	3.4.3 Local Connectivity	1, 2, 3	UD / P	• Short Report	Report to discuss, describe and demonstrate the location of the proposed development with an emphasis on accessibility, e.g. pedestrian gates.	UFS Policy

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.5 WATER	3.5.1 Occupant Amenity Water	4, 5, 6	ME; A	• Short Report	Report to list and describe water efficient features of the building, e.g. special fittings and re-use systems, if applicable. The saving of potable water should be included.	
				• Technical Drawings (Record)	To show schematic layout of water reticulation and water-efficient features.	
				• Data Sheets from suppliers / manufacturer	Data sheets to indicate water usage of fittings specified.	
				• Extracts from the Commissioning Report	Report to show that the system is effecting the savings as intended.	
	3.5.2 Water Meters	3, 4, 5, 6	ME	• Short Report	Report to document type and position of water meters, as well as integration with MBS.	UFS Policy
				• Technical Documentation (Record)	Drawings to show “as built” schematic layout of water reticulation with position of water meters.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.5 WATER (Continued)	3.5.2 Landscape Irrigation	4, 5, 6	CE; LA	• Short Report	Report to detail proposed landscape irrigation system, water sources and operation.	UFS Policy
				• Technical Documentation	To include technical layout on site plan and hydraulic drawings (record).	
	3.5.3 Heat Rejection Water	4, 5, 6	ME	• Short Report	Report should indicate the heat rejection requirements of the building and calculations for the reference case.	SANS 10400-O
					For natural ventilation designs indicate compliance with SANS 10400-O.	
				• Extract from specification to detail system	Report to demonstrate that system complies with design intentions.	
				• Extract from Commissioning Report	Drawings to shoe schematic hydraulic drawing.	
				• Record drawings		

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.6 MATERIALS	3.6.1 Building Re-use	-	A; P	• Survey of available building space	To be implemented when funds permit.	UFS Policy
	3.6.2 Re-use Materials	-	A; Designated Person	• Short Report	Report to document all separate uses of reused materials and products.	
			QS	• QS Report	Report to include an estimate of the material value of the reused material.	
			A	• Extract from specification	Specification to indicate where materials and products are to be reused.	
	3.6.3 Shell and Core or Integrated Fit-Out	1, 2, 3, 4	A	• Layout drawings	Typical situation at UFS will favour Integrated Fit-Out.	UFS Policy
			Building User	• Confirmation (written)	Confirmation that the layout of the architect conforms to the brief provided and that no changes prior to occupation will be made.	
				• Record Drawings	Drawings to show actual conditions as delivered.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.6 MATERIALS (Continued)	3.6.4 Concrete	4, 5	SE; Concrete Technologist	• Report	Report to indicate breakdown of concrete types used in project and replacement strategies for Portland Cement.	
			QS	• QS Report	QS to estimate material value of "new" concrete as a proportion of the project's total value.	
			MC	• Confirmation of Supplier	Supplier to confirm quantities of Portland Cement, waste product and aggregate supplied to site.	
	3.6.5 Steel	4, 5	SE	• Short Report	Report to indicate total amount (dry mass) of steel used within the building structure and QS estimate. Evidence of post-consumer content of steel used expressed as a percentage of the total.	
				• QS Report	Report to provide an estimate of the total mass and cost of the steel as a percentage of the total project value. Specification to identify steel requirements referencing post-consumer content.	
				• Extract from the specification		

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.6 MATERIALS (Continued)				• Confirmation from the supplier	Supplier to confirm quantity of steel provided and post-consumer recycled content.	
	3.6.6 PVC Minimization	4, 5	All Consultants	• Short Report	Report to identify major standard PVC uses in the building. Indicate by means of QS estimate the anticipated cost of PVC in project as reference case. Tabulate reduction of PVC costs against reference.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.6 MATERIALS (Continued)				• Confirmation from the supplier	Supplier to confirm quantity of steel provided and post-consumer recycled content.	
	3.6.7 PVC Minimization	4, 5	All Consultants	• Short Report	Report to identify major standard PVC uses in the building. Indicate by means of QS estimate the anticipated cost of PVC in project as reference case. Tabulate reduction of PVC costs against reference.	
	3.6.8 Sustainable Timber	4, 5	A; QS	• Short Report (1)	Report to summarize and indicate costs of reused, recycled and certified (FSC) timber. List of all uses of timber on the project.	FSC Certification
			A QS	• Short Report (2) • QS Report	Cost of timber vs. total cost of project, both estimated and actual. Schedule of all timber used on project.	
			MC; QS	• Timber Schedule	Specification to indicate that sources of timber meet criteria (e.g. FSC certificates).	
			A	• Extract from Specification	Confirm quantity, cost and type of timber supplied.	
			MC; Supplier	• Confirmation from supplier		

CREDIT CATEGORY	CREDIT		PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.7 LAND USE AND ECOLOGY	3.7.1	Location of Development	1, 2	A; LA Specialist	• Confirmation from registered ecologist or an experienced EIA practitioner	To state that the development area is not situated on land of high ecological value.	Ecologist to be registered with the South African Council for Natural Scientific Profession SACNAP Act (27 of 2003).
	3.7.2	Topsoil Protected	4, 5, 6	LA or Garden Services at UFS	• Short Report	To quantify amount of topsoil on site and now it will be protected during the building project.	
	3.7.3	Reuse of Land	1	A	• Short Report	To indicate the previously built area of the site (Location Plan / Site Plan). All of the UFS campuses fall within the urban edge of Bloemfontein.	UFS Policy
	3.7.4	Change of Ecological Value		Ecologist (registered)	• Completed Change of Ecological Value Calculator	Completed by ecologist and the calculator aims to compare the relative ecological value of land before and after development.	UFS Policy could undertake a complete study of each campus for future reference.

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.8 EMISSIONS	3.8.1 Legionella	4, 5, 6	ME; RME	• Statement with data survey	To confirm that all HVAC cooling towers, as well as hot water systems are maintained at temperatures that will prohibit the growth of legionella. Data survey to be included over at least a period of six months.	CIBSE TM 13 (2002). Minimizing the risk of Legionnaires Disease
	3.8.2 Refrigerant Gaseous ODP	Ongoing	ME; RME	• Short Report	Report to document the phasing out of harmful HVAC refrigerants and gaseous fire suppression systems. The replacement system shall be specified and the ME/RME shall produce written confirmation from the contractor / supplier that the replacement products have an Ozone Depletion Potential (ODP) of zero. Report to indicate type of HVAC system and refrigerants used.	CIBSE (2000) ASHRAE (2004) Institute of Refrigeration (1995) ASHRAE standard 15
	3.8.3 Refrigerant Global Warming Potential (GWP)		ME; RME	• Short Report • Extract from Specification • Confirmation from contractor / supplier	If relevant, describe how existing systems are refurbished and converted with less harmful refrigerants. Description of system and refrigerants to be used. Confirmation that systems is installed according to specification and commissioned as requested.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.8 EMISSIONS (Continued)	3.8.4 Refrigerant Leaks	5, 6 Post-occupancy	ME; RME	• Short Report	Results of vacuum tests of HVAC-system prior to commissioning.	UFS Policy
	3.8.5 Insulant ODP	4, 5, 6	A; ME	• Extract from Specification	To indicate requirements for thermal insulants stipulated.	
				• Summary sheet	Listing all thermal insulation products and their application.	
				• Manufacturer's Data Sheet	For each product to confirm products are free of a zone-depleting substances in both manufacture and composition.	
				• Confirmation from Contractor	To the effect that all materials installed are as per summary sheet.	
	3.8.6 Watercourse Pollution	3, 4	A; CE; LA	• Short Report	Describing the original peak storm water flow against projected flow.	SANS 1200-LE (1982)
					Describing storm water treatments, e.g. swales.	
				• Technical Documentation	Documentation to specify treatment system and show design and record ("as built") versions.	

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.8 EMISSIONS (Continued)	3.8.7 Discharge to Sewer	4, 5, 6	A; CE	• Sewerage Calculator • Potable Water Calculator	UFS aims to reduce discharge from fittings / fixtures. Calculations done in accordance with the Potable Water and Sewerage Calculators Guide from the GBCSA (website: http://www.gbcsa.org.za)	UFS Policy
	3.8.8 Light Pollution	4, 5, 6	EE; REE	• Short Report • Technical Documentation • Manufacturer's Data Sheets	Detailing external and atrium lighting on the site to demonstrate that no light spill impacts on the night sky. Tender and Record Drawings showing the position and light distribution of fittings. To indicate lighting levels and light distribution diagram.	
	3.8.9. Boiler and Generator Emissions	3, 4, 5	ME	• Short Report • Extract from Specification	Report to reference each boiler with capacity and emission rate. Referencing each generator and confirming conformation to EPA emission standards. Specification to indicate compliance with acceptable emission rates.	US EPA

CREDIT CATEGORY	CREDIT	PROJECT WORKSTAGE (ARCHITECT)	CONSULTANT / CONTRACTOR	DOCUMENTATION REQUIRED	NOTES	GUIDELINES, CODES, STANDARDS
3.9 INNOVATION			All Consultants and Contractors	• As per initiative	Under the guideline, innovative, energy conservation initiatives in the built environment will be documented and may become part of UFS Policy.	