

10 Appendix B: Greening Guideline for the Built Environment

The following guideline is an extract from an article prepared by Jeremy Gibberd of the Council of Scientific and Industrial Research, entitled Sustainable Development Criteria for

Built Environment Projects in South Africa and published in the Human Settlements Review, Volume 1, Number 1, September 2010. It is based on research conducted for the Gauteng Department of Agriculture and Rural Development which required a set of sustainable development criteria for built environment projects requiring environmental impact assessments.

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Land use and integrated development	
Objective	Development should be integrated with existing and planned infrastructure and land use to ensure efficient systems and balanced use of land.
Criteria	Application
Spatial development frameworks	Proposed development can demonstrate it is aligned with the spatial development framework.
Environmental management	Frameworks: Proposed development can demonstrate that it is aligned with relevant environmental frameworks.
City development strategies	Developments should demonstrate that it is aligned with relevant city development strategies.
Urban development boundary	Developments should demonstrate that it is within the urban development boundary.
Existing and planned infrastructure	Proposed developments can demonstrate it will be integrated into and use existing or planned infrastructure such as roads, storm water drains, sewage systems, water and energy supplies. Through studies local authorities have accepted these findings.
Public transport networks	Through existing public transport routes access to the site can be easily achieved.
Complimentary social and economic land uses	Development demonstrates that it will compliment local land uses.
Building density	Development demonstrates that it will exceed the minimum building density requirements of relevant local policy and planning schemes.
Open spaces	The nature and type of open space provision in the development is aligned with local planning, policy and bylaws. Development includes the following minimum open space provision.
Type of development	Open space provision
Subsidy housing	20% of site area
Other residential	20% of site area
Business	20% of site area
Industrial	20% of site area
Where open space provision is specified by local municipalities these can be aligned with in preference to the above requirements.	

Biodiversity

Objective	Development should be located where damage to natural environments and ecosystems is minimized. It should ensure that existing natural environments are preserved and take opportunities to strengthen this.
Criteria	Application
Sensitive areas	Proposed development demonstrates that it does not include any areas that could be defined as sensitive. If the development does include areas that may be defined as sensitive, the project demonstrates full compliance with all requirements of existing biodiversity assessments.
Greenfield sites	Proposed development can demonstrate that the site that will be used is not a green field site and does not provide valuable ecosystem services. The site proposed has been previously been built on or is already extensively disturbed. Where part of a proposed site is in a green field condition the proposed development retains and protects this within the proposed development.
Site clearing	Design and contract documentation indicating the following considerations
a. Site clearing	Large-scale clearing of the site is avoided and the area disturbed by development is minimised
b. Mature trees and natural features	Mature trees and natural features such as large rocks or outcrops are retained (see also MC Materials and construction for protection measures). Exception to this are trees which are invasive species and trees which are incompatible with the relevant town planning scheme.
c. Existing vegetation	Where existing indigenous vegetation is to be cleared and is of an appropriate quality, plants should be rescued and replanted, or propagated and replaced.
d. Locally indigenous planting	Planting schemes including locally indigenous plants proposed for the development. This demonstrates how local biodiversity and the creation of habitats will be supported.

Agriculture and landscaping

Objective	Development should not lead to a loss of agricultural land. Appropriate agricultural and landscaping should be integrated in developments to improve the provision of local fresh food and ecosystem services.
Criteria	Applications
Retention of agricultural land	Development should avoid sites with high agricultural potential and ensure that this land is retained for farming. The proposed development does not encroach on land identified by available agricultural potential atlases as land with high agricultural potential. Exceptions to this include the land within the urban edge that has high development potential such land located in a development node. Development nodes are defined in local Spatial Development Frameworks (SDFs).

Agriculture and landscaping

Environmental impacts of agriculture	Management plans that ensure that negative environmental impacts of agriculture are minimised. This may include plans to manage and monitor agricultural inputs such as fertilizer, herbicides and pesticides, in order to minimise negative environmental impacts. The use of organic and labour intensive farming methods.
Degraded or contained sites Planting	The proposed development is located on a degraded or contaminated site. Proposed remediation and improvement processes are outlined. The proposed development demonstrates how planting will be effectively integrated into the site. Planting will be determined by local circumstances, however the following guideline provision is proposed.

Green roofs

Proposed development demonstrates that the vegetation lost through development, or a substantial portion of this (over 40%) will be replaced in the form of green roofs.

Hard external surfaces	Large areas (over 500m ²) of impermeable external hard surfaces are avoided. This does not apply to strips of hard external surfaces (less than 15m in width) such as those used for roads and paths.
Environmental impacts of landscaping	Management plan that ensures that negative environmental impacts of landscaping maintenance are minimized. This may include plans to use landscaping that has minimal irrigation requirements, and to manage and monitor landscape inputs such as fertilizer, herbicides and pesticides in order to minimise negative environmental impacts. It may also include the use of organic and labour intensive methods.

Water, Sewage and Storm Water Runoff

Objective	Development should minimise the consumption of municipal potable water and the disposal of sewage into municipal systems. Increase storm water runoff and water pollution should be avoided.
Criteria	Application
Water efficient fittings	Efficient water fittings should be used in new development to avoid wasting potable water. Shower heads have a maximum flow rate of 10L /minute. Wash-handbasins taps have a maximum flow rate of 6L/minute. Toilets are not water based or are dual flush and do not exceed 3L (1/2 flush) and 6L (full flush). Waterless urinals are used or these have a maximum flush of 2L/flush.
Rainwater harvesting	Development demonstrates how it will use rainwater harvesting to reduce mains potable water consumption and include the following minimum provision. Where possible this capacity should be increased.

Type of development	Minimum rainwater harvesting capacity
Subsidy house	40L/m ² of gross floor area
Other Residential	40L/m ² of gross floor area
Business	20L/m ² of gross floor area
Industrial	10L/m ² of gross floor area

The above capacity can be provided individually (per building) or collectively in larger storage facilities such as large underground tanks

Materials and Construction	
Objective	Development should minimize the negative environmental impacts of construction and the consumption of resources. Positive social and economic impacts of construction and resources used should be maximised.
Criteria	Application
Sourcing of building materials	Procurement policy requiring 20% of materials (such as bricks, sand and cement) by weight used in construction to be sourced within 400km from site.
Sourcing of components and equipment	Procurement policy requiring 20% of equipment and components (such as electrical, mechanical and wet services materials and equipment and components such as doors and windows) by value to be sourced from within 400km of site.
Local jobs	Procurement policy that requires 80% of construction workers to be sourced within 50km of site.
Labour intensive construction	Design and construction strategies support the use of labour intensive approaches. Targets in terms of person years of construction work created per million rand construction spent should be provided showing how these compare favorably with best practice benchmarks. Best practice benchmarks can be obtained from organisations such as the Development Bank of South Africa and the Department of Public Works (Expanded Public Works Programme). Compliance with the Construction Industry Development Board (CIDB)'s labour intensive construction guides including 'labour-based methods and technologies for employment intensive construction works' and implementing labour intensive road works (CIDB 2005, CIDB 2007).
SMME support	Procurement policy supports the use of small and medium enterprises based within 50km of site. Compliance with the CIDB's guide for small and medium enterprises and contracting '3 R's basic guide for SMMEs' (CIDB 2003).
HIV/AIDS	Construction planning and contract documentation for the development comply with the 'specification for HIV/AIDS awareness' (CIDB 2003a).

Materials and Construction

Material Selection	<p>Design specification and contract documents reflect the following material selection considerations.</p> <p>Embodied energy: Preference is given to materials that have consumed the least amount energy in their sourcing, manufacturing and transportation.</p> <p>Reused materials: Reused materials from the demolition of buildings, including crushed aggregate is used in new construction.</p> <p>Recycled content: Preference is given to materials that have recycled content over those that do not.</p> <p>Renewable sources: Checks and accreditations are in place to ensure that materials specified, such as timber, are from renewable sources. For instance, timber with Forest Stewardship Council (FSC) certification comes from forests where trees are replanted.</p> <p>Grown Materials: Where possible, renewable grown materials such as timber thatch, wool, and cork are used in construction.</p> <p>Insulation: Insulation that contains refrigerants or uses refrigerants in its manufacturing process is avoided.</p> <p>PVC: The use of PVC based materials and components to be avoided or minimized.</p> <p>Construction waste: A requirement of at least 30% of all construction waste to be recycled or reused is included in contractual documentation.</p>
Soil Retention	<p>Construction and contract documentation indicating the following considerations.</p>
Protection of vegetation and natural features	<p>Movement of Earth: Large-scale cut and fill operations and movement of earth are avoided.</p> <p>Soil Erosion: Soil erosion and sediments control plan for construction works which indicate measures such as mulching, seeding, vegetative filter strips, gabions and retention ponds to prevent soil erosion.</p> <p>Retention of topsoil: Where the topsoil is removed this is reused on site and not transported elsewhere.</p> <p>Construction and contract documentation provide for protection measures such as buffers, fencing and signage around trees, vegetation and natural features being retained on site.</p>

Energy, Mechanical and Electrical Systems

Objective	Development should minimize the use of non-renewable energy and maximize use of renewable energy sources.
Criteria	Application
Urban heat island	Roof and external hard surfaces have an absorption value of less than 0.5. For further information see 'SANS 204, Energy Efficiency in Buildings standard' (SABS2009).
Urban heat island	Large areas of car parking or hard external surfaces (over 500m ²) should be avoided. If these cannot be avoided, a minimum of 20% of the area should be shaded, preferably by trees.

Energy, Mechanical and Electrical Systems

Site layout	Site layouts and modeling demonstrates that buildings have good access to fresh air, views and daylight. A minimum of 4m of clear external space (vegetation and open fencing can be located in this area but not solid walls or other buildings) immediately in front of windows in useable spaces should be provided. This does not apply to rooms not occupied on a continuous basis such as storerooms and toilets.
Orientation	The long section of buildings should be orientated to +/- 15 degrees North and the extent of the façade facing north should be maximised while the length of façade facing east and west should be minimised.
Built form	Building plan depths should not exceed 15m, unless buildings have substantial atria or their particular function i.e. a cinema, requires this.
Glazing	Solar shading and glazing designed to comply with SANS 204 Energy Efficiency in Buildings standard (SABS 2009)
Thermal insulation	Insulation values of all elements of the building envelope (roof, wall and floors) meet 'SANS 204 Energy Efficiency in Buildings' Standard (SABS 2009)
Natural ventilation	Opening area in building envelope (such as opening windows) equivalent to a minimum of 5% of useable area.
Daylight	Daylight modeling showing that 80% of useable area within buildings has a 2% or higher daylight factor. A deemed to satisfy condition for this can be achieved where 8% of the useable area can be shown to be within 2h of an external window. Where h is the height of the external window.
Passive environmental control	Proposed buildings demonstrate use of passive environmental control strategies to reduce energy consumption.
Water heating	Water heating is achieved through solar water heaters or other energy efficient means of heating water provided
Electrical lighting	Internal electrical lighting power densities in the development comply with SANS 204 Energy Efficiency in Building Standards.
Electrical controls	Lighting controls such as motion sensors, timers and daylight switching are used to ensure lighting is only on when needed.
Swimming and ornamental pools	Avoidance of swimming and ornamental pools, unless these have no energy demands or these are met from renewable energy sources.
Energy consumption and peak demands	Proposed development confirms that it will comply with 'SANS 204 Standard on Energy Efficiency in Buildings' standard and achieve energy consumption and peak demand targets.
Renewable energy	New development demonstrates that 10% will be achieved onsite from renewable sources, with views of increasing capacity where possible.

Waste and pollution

Objective	New development should minimise the amount of waste diverted to landfill. Pollution should also be avoided.
Criteria	Application
Recycling provision	Provision for waste recycling made in the new development including recycling space of sufficient size and appropriately located to ease of use by occupants and recyclers.
Organic waste	Where possible, development proposals demonstrate how organic waste produced on site is recycled on site.
Recycling plans	Recycling plan which sets out waste minimisation, reuse and recycling targets and describes strategies and systems that will be used to achieve these including local recycling partners.
External lighting	Low level lighting and light fittings with hoods are used to avoid light pollution. In addition control such as timers and movement sensors are used to ensure lighting is only on when needed.

Local and economic development

Objective	Development should support diverse productive local economies that create work and sustainable enterprises.
Criteria	Application
Small enterprise development	The proposed development demonstrates that it will support existing or new or small or micro enterprises.
Job creation	The proposed development demonstrates that it will support a labour intensive approach and shows how employment created will be in line with local best practice.

Local and economic development

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Transport and routes

Objective	Development should reduce reliance on cars and ensure that energy efficient, environmentally friendly forms of transport are encouraged.
Criteria	Application
Public transport	Development demonstrates that people who work and live in the development are located within 1,200m of scheduled public transport (bus or train). Where public transport is not available, a green transport plan is developed which demonstrates how car usage will be avoided and energy efficient transport used. This could include agreements with minibus or bus operators and provide details on how other criteria in this section would be achieved.
Walking	Provision of dedicated accessible pedestrian paths on the site linking buildings to each other and to public transport nodes on public highways.
Cycling and walking routes	Cycle routes along dedicated cycle paths and clearly demarcated cycle lanes are provided for at least the equivalent length of vehicular roads provided within the estate. Cyclist and pedestrians are given priority at all crossings points and junctions and measures such as signage and traffic calming features are incorporated into roads to ensure that drivers acknowledge this.
Cycling facilities	<i>Work environments:</i> Secure cycling parking is provided for at least 3% of the building occupants. <i>Residential environments:</i> At least one secure parking point per unit is provided.
Local facilities	Access to following local facilities is provided
Type of development	Local facilities
Subsidy housing	Access to the following facilities within 750m can be demonstrated: bank (or bank ATM), crèches, food retail and leisure and recreation facilities
Other residential	
Business	Access to the following facilities within 400m can be demonstrated: bank (or bank ATM), crèches, food retail or café/restaurants.
Industrial	
Working facilities	Access to the following local facilities is provided.
Type of development	Working facilities
Subsidy housing	Access to business to a business centre/facility with video/tele-conferencing/internet, meeting rooms and printing facilities within 1,200m of every residential unit.
Other residential	
Business	Accesses to broadband/video/ tele-conferencing within 400m of any office work environment accommodating more than 5 people.
Industrial	

Health and Well Being

Objective	Development should support the health and well being of people on site and in neighboring communities.
Criteria	Application
Daylight	Eighty percent of all usable space within buildings should achieve a 2.0% daylight factor. This can be demonstrated through daylight modeling. Alternatively, an acceptable deemed to satisfy condition is to demonstrate that eighty percent of the usable area within 2.5H of an external window, where H is the height of the head of the window.
Ventilation	All buildings have ventilation openings (such as an opening window) of at least 5% of the associated usable floor.
Views	Eighty percent of all usable area within buildings is within 6m of an external window and has a direct line of site to this. An unobstructed space of 4m is provided externally in front of windows (vegetation and open fencing can be included but not solid walls and other buildings) to ensure that the view of the external space is adequate.
Indoor air quality	The specification of materials for buildings in the development should avoid materials and finishes that would have a negative impact on indoor air quality.
VOCs	Some carpets, adhesives and paints have volatile organic compounds (VOCs) which are off-gassed, negatively affecting air quality. Products with no or low VOCs are specified.
Formaldehyde	Formaldehyde similarly can be off-gassed from composite boards and timber products, negatively affecting indoor air quality. Products with no or low formaldehyde are specified.
Exercise and recreation facilities	Access to following local facilities provided:
Subsidy housing	Access to the following facilities within 1000m from residential environment can be demonstrated: park/gym/walking or running trails.
Other residential	
Business	Access to the following facilities within 400m from work environment can be demonstrated: park/gym/walking or running trails.
Industrial	Not applicable.

Education and Ongoing Learning

Objective	Development should support education and ongoing learning of people on site and in neighboring communities.
Criteria	Application
Type of development	Exercise and recreation facilities
Subsidy housing	Facility for education and ongoing learning that can accommodate 5% of the residents will be made available in week day evenings and during weekends. A facility of this nature should be available within 1,000m of every resident.
Other residential	
Business	Facility for education and ongoing learning that can accommodate 5% of the workers will be made available A facility of this nature should be available within 400m of every workstation.
Industrial	
Primary schools	Primary school facilities are located within 2,250m of all family dwellings along a safe walking route
Secondary schools	Secondary school facilities are located within 1,500m of all family dwellings along a safe walking route
Site operation worker training	Proposed development demonstrates that human resource policy will include a requirement for site operation workers to access accredited education for a minimum equivalent of 5% of working hours.
Construction worker training	Construction contract documents indicates a requirement for construction workers to access accredited education for a minimum equivalent of 5% of working hours

Housing

Objective	Development should support Inclusionary Housing and ensure that people who work on site do not have to travel long distances to access affordable housing.
Criteria	Application
Affordable housing	The development demonstrates everyone working on the site that needs affordable housing is able to access this within 10km of the site
Inclusionary housing	Inclusionary housing is integrated in the development in line with the inclusionary Housing Policy and local compulsory prescriptions.

Social Cohesion and inclusion

Objective	Development should support social cohesion and benefit the full diversity of the population.
Criteria	Application
Sporting and recreation facilities	Affordable access to sporting and recreational facilities in the development is provided for local communities as well as for people within the development.

Social Cohesion and inclusion

Health and education facilities	Affordable access to health and education facilities in the development is provided for local communities as well as for people within the development.
Children and youth facilities	Affordable access to children and youth facilities in the development is provided for local communities as well as for people within the development.
Natural, cultural and historical landscapes	Access is provided to the local community as well as for people within the development to natural, cultural and historical landscapes located within the development.
Inclusive and accessible facilities	The new development demonstrates that the facilities will be inclusive and able to accommodate the full diversity of the population.
Information about the development	Inclusive participatory processes are planned that respond to local communities and take into account issues such as language, income, education and disability.

Management and monitoring

Objectives	Sustainable development targets that reflect the South African context should be set for the development. Management and monitoring should be carried out to ensure that these are achieved.
Criteria	Application
Development conditions	Development should make the Record of Decisions (ROD) and other development conditions readily available to the local community through a website or other means. Information and reporting on compliance should also be made available through the same means.
Environmental Management plan	The plan should cover both construction and operational phases. Environmental Management Plan includes sustainable development criteria from the guide and show how these will be achieved.
Environmental control officer (ECO)	An Environment Control Office is appointed for the development. The ECO reports on the achievement of ROD development requirements, the EMP and sustainable development targets to management (and possibly to relevant stakeholders such as the future homeowners, the local community and local authorities) Reports are developed on a monthly basis during construction phases and on a two monthly basis during operation of the development.
Operational performance	Building uses guides are developed for occupants of buildings to ensure that systems designed to support sustainability are maintained and operated optimally.
a. Operational performance	Facilities management manuals and monitoring requirements to ensure that systems designed to support sustainability are maintained and operated optimally. As minimum, energy, water and waste performance against targets should be reported on.
Independent certification	Commitment by developer that independent environmental rating or certification such a 'Greenstar' rating or 'Fair Trade in Tourism' certification will be achieved.