

City of Tshwane (CoT) Green Building Development Policy

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Queries and comments

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City of Tshwane (CoT) Green Building Development Policy

Table of Contents

Definitions	1
1 Introduction.....	2
2 Application of the Green Building Policy	2
3 Submissions	2
4 Complete and Correct Submissions	2
5 Green Building Development Policy: Penalties for Non Compliance.....	2
6 Green Building Development Incentive Scheme: Support for Compliance.....	3
EN Energy.....	4
EN 1 Orientation	4
EN 2 Floor plate depth	4
EN 3 Floor insulation	4
EN 4 Wall insulation	5
EN 5 Roof insulation.....	5
EN 6 Glazing & Solar exposure.....	6
EN 7 Urban heat island	9
EN 8 Internal lighting power density.....	9
EN 9 Lighting zoning	9
EN 10 Internal lighting controls	10
EN 11 External lighting controls	10
EN 12 External lighting power ratio	11
EN 13 Water heating	12
EN 14 Hot water pipes	12
EN 15 Heating, Cooling and Ventilation.....	12
EN 16 Energy Sub metering.....	13
EN 17 Renewable Energy	13
WA Water.....	14
WA 1 Toilet flush	14
WA 2 Wash hand basin taps	14
WA 3 Baths.....	14
WA 4 Showers.....	14
WA 5 Hot water pipes.....	14
WA 6 Rainwater harvesting.....	14
WA 7 Onsite retention	15
WA 8 Swimming and ornamental pools	15
WA 9 Irrigation.....	16
WE Waste	16
WE 1 Solid waste	16
TR Transport.....	16

TR 1 Cycling provision	16
TR 2 Cycle routes	17
TR 3 Car parking	17
TR 4 Pedestrian routes	17
TR 5 Local facilities	17
HE Health	18
HE 1 Daylight.....	18
HE 2 External Views.....	19
HE 3 Natural ventilation.....	19
7 Submission Form A: Mandatory Standards	21
8 Submission Form B: Promoted Standards.....	23
9 Green Building Development Incentive Scheme Points	25
10 Green Building Development Incentive Scheme Certificate	26

Definitions

Air conditioning: A mechanical system installed in a building to control the temperature and humidity of the air by heating or cooling.

Envelope: The external elements of the building such as the walls, windows and roofs.

Glazing: Windows, glazed doors or other transparent and translucent elements including their frames (such as glass bricks, glazed doors, etc) located in the building fabric.

Gross floor area: This covers the total floor area of the building protected from the elements but excludes parking.

Lighting power density: The total amount of that which will be consumed by the lighting systems in a space and it includes the lamps, ballast, current regulators and control devices. The total is arrived at by adding the energy used and then dividing it by the floor area of the room.

R-Value: The measurement of the thermal resistance of a material which is the effectiveness of the material to resist the flow of heat, i.e. the thermal resistance ($m^2.K/W$) of a component calculated by dividing its thickness by its thermal conductivity.

Shading coefficient: A measure of the solar gain performance of windows. It is the ratio of the solar energy transmitted and convected by the window to the solar energy transmitted and convected by clear 3 mm glass.

Solar access: the amount of useful sunshine reaching the habitable areas of a building.

Solar Heat Gain Coefficient (SHGC): a measure of the amount of solar radiation (heat) passing through the entire window, including the frame. SHGC is expressed as a number between 0 and 1.0. The lower the SHGC the better.

Thermal mass: a term to describe the ability of building materials to store heat . Building materials that are heavy weight store a lot of heat so are said to have high thermal mass. Materials that are lightweight do not store much heat and have a low thermal mass.

Thermal resistance: The resistance to heat transfer across a material. Thermal resistance is measured as an R-Value. The higher the R-Value the better the ability of the material to resist heat flow.

Useable area: The area of floor in a building capable of occupation. This excludes areas such as toilets, bathrooms, storage, ducts and vertical circulation.

Ventilation opening: An opening in the external wall, floor or roof of a building designed to allow air movement into or out of the building by natural means including a permanent opening, an openable part of a window, a door or other device which can be held open.

Watt (W): The determined metric or SI (international system of measuring units) value for energy loads and is used to rate electrical motors, appliances, lights etc. and in expressing energy loads and energy consumption.

City of Tshwane (CoT) Green Building Development Policy

1 Introduction

The Green Building Policy developed by the City of Tshwane aims to improve the performance of the built environment in order to reduce environmental impacts and improve quality of life within the city.

The Green Building Development Policy is one of three related instruments which the municipality has developed to ensure, and encourage, the development of a more sustainable built environment. These instruments are:

- **Green Building Development By-Law:** This sets out the legislative status of the Green Building Development Policy and Green Building Development Incentive Scheme. This can be downloaded from www.tshwane.gov.za
- **Green Building Development Policy:** The Green Building Development Policy sets out green building development standards that are either mandatory (must be complied with) or promoted (can be complied).
- **Green Building Development Incentive Scheme:** This scheme has been developed to encourage new buildings to surpass green building development mandatory standards and adopt promoted standards.

This document sets out the Green Building Development Policy. This includes the mandatory and promoted green building development standards, submission forms for mandatory and promoted standards and a sample Green Building Development Incentive Scheme certificate.

2 Application of the Green Building Policy

The Green Building Development Policy only applies to developments that require planning or building control approval. The Policy sets out standards that are either **mandatory** or **promoted** by the municipality. Mandatory standards must be complied with. Promoted standards are voluntary, but demonstrating compliance with these may be used to ensure developments are eligible for incentive schemes.

Building plan approval submissions to Council must demonstrate that proposed development or refurbishment will comply with the mandatory standards outlined in the Green Building Development Policy. Compliance with mandatory standards is demonstrated through the submission of completed forms (located at the end of this document) and required information. Compliance with promoted standards is demonstrated in the same way.

It should be noted that submission requirements may be amended from time to time by the Council in order to support ongoing performance improvement in the built environment. It is the responsibility of persons wishing to submit applications for building plan approval to check that they are using the latest, and current, submission forms.

3 Submissions

The development of submissions must be made by a competent person. A competent person is defined as a built environment professional such as an Architect, Engineer or Quantity Surveyor with a professional registration. Competency in completing required documentation will be supported through training courses run by the City of Tshwane from time to time.

4 Complete and Correct Submissions

Complete and comprehensive documentation as outlined in this document must be provided. These are outlined under each requirement as ***Submission Requirements***. Incomplete, or incorrectly formatted, documentation will not be assessed for approval and will be returned for completion and resubmission.

5 Green Building Development Policy: Penalties for Non Compliance

Submissions that do not comply with **mandatory** standards will not be approved until the submission is

fully compliant. Buildings found to be non-compliant with **mandatory** standards at the point of completion may have their occupation certificate withheld until the building is fully compliant.

Non compliance may therefore result in costly delays. It is therefore in your interest to understand the Green Building by-law and Incentive Scheme Policy and ensure your submission, and the consequent project, are fully compliant.

6 Green Building Development Incentive Scheme: Support for Compliance

The Municipality may, from time to time, provide incentives to submissions that not only comply with mandatory standards but also comply with **promoted** standards. Incentives may include:

- Fast tracked application procedures
- Reduced application costs
- Reduced bulk services contribution
- Relaxation of specific planning requirements such as parking provision
- Access to reduced cost or free green building technical training and seminars
- Access to municipal negotiated discounts for energy efficient / sustainable technologies
- Access to municipal negotiated finance interest rate reductions from banks and financial institutions
- Assistance in applying for grants or tax incentives for investments in energy efficient / sustainable technologies
- Formal recognition of performance through certification.

EN Energy

EN 1 Orientation

Buildings must be orientated within 15 degrees of true North in order to minimise unwanted heat gains and losses. Occupancy exceptions are outlined below.

Submission Requirements

1. Site plan indicating building layout with North indicated

EN 2 Floor plate depth

Building depth must not exceed 15m to ensure interior spaces can be naturally ventilated and lit. Occupancy exceptions are outlined below.

Class of Occupancy or Building	Occupancy	Building orientation	Floor plate depth
A1	Entertainment & Public assembly	Not applicable	Not applicable
A2	Theatrical & indoor sport	Not applicable	Not applicable
A3	Places of instruction	North	15m
A4	Worship	Not applicable	Not applicable
A5	Outdoor sport is viewed	Not applicable	Not applicable
B1	High risk commercial	North	15m
B2	Moderate risk commercial	North	15m
B3	Low risk commercial	North	15m
C1	Exhibition Halls	Not applicable	Not applicable
C2	Museums	Not applicable	Not applicable
D1	High risk industrial	Not applicable	Not applicable
D2	Moderate risk industrial	North	15m
D3	Low risk industrial	North	15m
D4	Plant rooms	Not applicable	Not applicable
E1	Places of detention	North	15m
E2	Hospitals	North	15m
E3	Other institutional residences	North	15m
F1	Large shops	Not applicable	Not applicable
F2	Small shops	North	15m
F3	Wholesaler's store	Not applicable	Not applicable
G1	Offices	North	15m
H1	Hotels	North	15m
H2	Dormitories	North	15m
H3	Domestic residences	North	15m
H4	Dwelling houses	North	15m
J1	High risk storage	Not applicable	Not applicable
J2	Moderate risk storage	Not applicable	Not applicable
J3	Low risk storage	Not applicable	Not applicable
J4	Parking areas covered	Not applicable	Not applicable

Table 1: Occupancy types and building orientation and floor plate depth

Submission Requirements

1. Site plan indicating building layout . Building layouts should be annotated with width dimension at their widest/deepest points. .

EN 3 Floor insulation

Floor insulation should comply with SANS 204. This requires buildings with a floor area of less than 500m² with a concrete slab on the ground to have insulation installed around the vertical edge of the perimeter. This insulation should have an R-value of no less than 1.0, be water resistant, be continuous around the perimeter of the slab and be installed to a minimum depth of 300mm.

Where ground floors are suspended above ground, insulation around the perimeter and under the slab should be installed and have a minimum R-value of 1.5.

Ground floors with in-slab heating should have insulation installed around the vertical edge and underneath the slab with an R-value of not less than 1.

Submission Requirements

1. 1: 10 sections of foundation or raised floor showing insulation detail.
2. R-value of insulation should be provided.

EN 4 Wall insulation

Wall insulation must comply with SANS 204. This requires walls with a mass of less than 300kg/m² and for occupancies not including low rise office buildings, strip shopping malls, clinics, schools and houses under 132m² to have a total R-value of 1.9 m²· K/W.

Low rise office buildings, strip shopping malls, clinics, schools and houses under 132m² with external walls with densities greater than 300kg/m³ and internal masonry with a density over 150KG/m² should have walls with a minimum total R-value of be 0.9 m²· K/W.

Submission Requirements

1. 1: 10 sections of wall construction showing insulation detail.
2. Calculations showing total R-value of each wall type

EN 5 Roof insulation

A. Slab or flexible insulation

Roof insulation must comply with R-values outlined in SANS 204. R-values required for slab or flexible insulation are outlined in the table below.

Aspect	Requirement
Minimum required total R-value (m ² · K/W.) (for roof solar absorptance of more than 0.55)	3.2
Direction of heat flow	Up
Estimate total R-value (m ² · K/W) of roof and ceiling materials (roof covering and plasterboard only)	0.35-0.4
Estimated minimum address R-value of insulation (m ² · K/W)	2.3 -3.35

Table 2: Minimum levels of insulation in an unventilated roof and ceiling construction

Submission Requirements

1. 1: 10 sections of roof construction showing insulation detail.
2. Calculations showing total R-value of roof.

B. Reflective foil laminate insulation

R-values required for reflective foil insulation are outlined in the table below.

Emittance of added reflective insulation	Direction of heat flow	R-value added by reflective foil insulation					
		Pitched roof (over or equal to 10°) with horizontal ceiling		Flat skillion or pitched roof (over or equal to 10°) with horizontal ceiling	Pitched roof with cathedral ceilings		
		Natural ventilations roof space	Non-ventilation roof space			22°	30°
0.2 outer 0.05 inner	Downwards	1.21	1.12	1.28	0.96	0.86	0.66

0.2 outer 0.05 inner	Upwards	0.59	0.75	0.68	0.72	0.74	0.77
0.9 outer 0.05 inner	Downwards	1.01	0.92	1.06	0.74	0.64	0.44
0.9 outer 0.05 inner	Upwards	0.40	0.55	0.49	0.51	0.52	0.53
Note: Reflective foil insulation values include a 15mm air gap. Reflective insulation should work in conjunction with the an air gap to be effective							

Table 3: Minimum levels of insulation in roofs with reflective foil insulation

Submission Requirements

1. 1: 10 sections of roof construction showing insulation detail.
2. Calculations showing total R-value of roof.

EN 6 Glazing & Solar exposure

Glazing and shading should meet the requirements of SANS 204. The requirements below are for buildings with natural environmental control and align with SANS 204-2. Buildings with artificial ventilation or air conditioning should meet the requirements outlined in SANS 204-3.

Compliance with SANS 204 -2 requires the aggregate conductance and solar heat gain in each storey not to exceed the values obtained by multiplying the net floor area measured within the enclosed walls with the constants C_u for conductance and C_{SHGC} for solar heat gain given in the table below.

Constants	Requirement
Conductance C_u	1.2
Solar heat gain C_{SHGC}	0.15

The aggregate conductance and solar heat gain of glazing in each storey is calculated by adding the conductance and solar heat gain of each glazing element in the following way:

a) For conductance

$$(A_1 \times U_1) + (A_2 \times U_2) + (A_3 \times U_3) + \dots$$

Where $A_{1,2,3}$ is the area of each glazing element (with 1, 2, 3 indicating specific glazing elements)

Where $U_{1,2,3}$ is the U-value of glazing element (with 1, 2, 3 indicating specific glazing elements)

b) For solar heat gain

$$(A_1 \times S_1 \times E_{1_1}) + (A_2 \times S_2 \times E_{1_2}) + A_3 \times S_3 \times E_{1_3}) + \dots$$

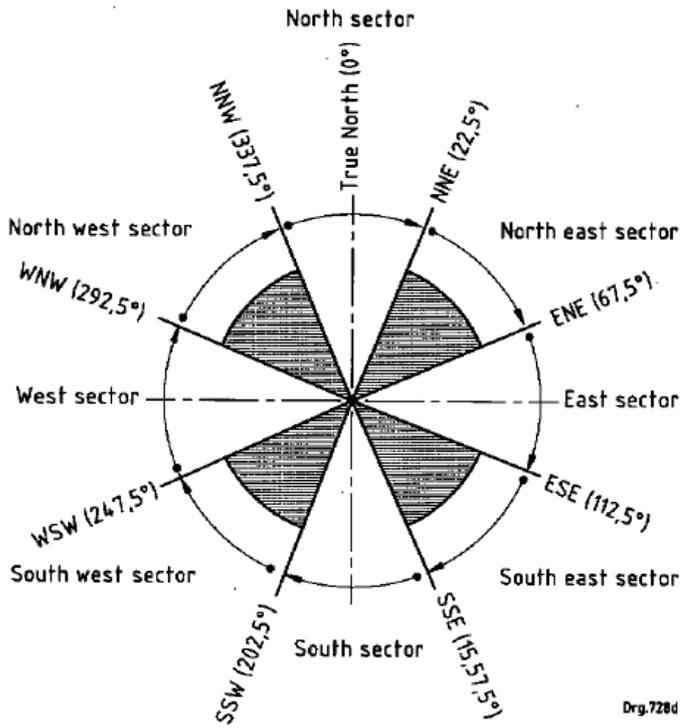
Where $A_{1,2,3}$ is the area of each glazing element (with 1, 2, 3 indicating specific glazing elements)

Where $S_{1,2,3}$ is the SHGC of the transparent or translucent glazing elements in each glazing element (with 1, 2, 3 indicating specific glazing area)

Where $E_{1,2,3}$ is the solar exposure factor for each glazing element (obtained from table x below) U-value of glazing element (with 1, 2, 3 indicating specific glazing elements)

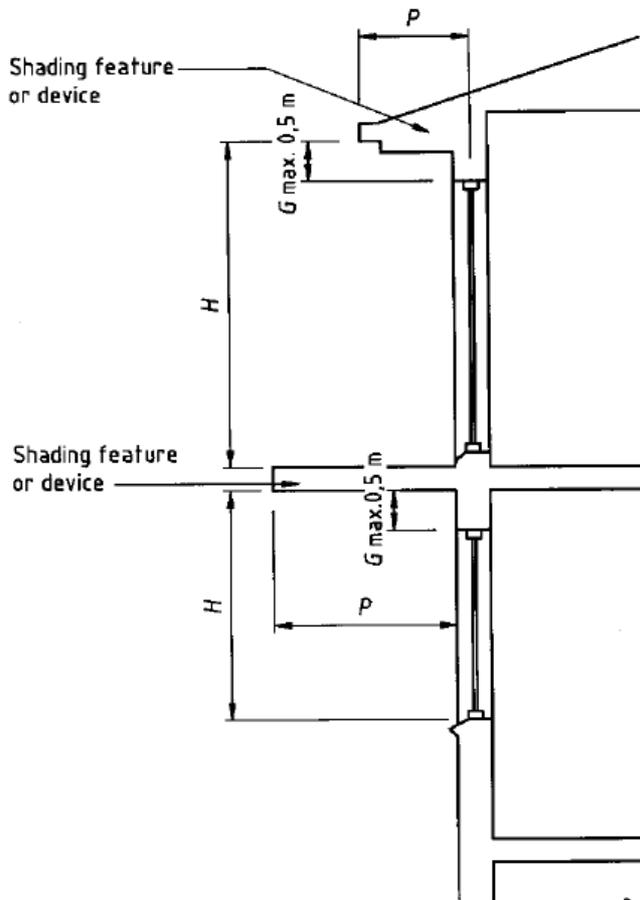
Submission Requirements

1. Calculations indicating compliance with conductance and solar heat gain requirements.



Drp.728d

Figure 1: Orientation sectors



Drp.728e

Figure 2: Method of measuring P and H

1	2	3	4	5	6	7	8	9
<i>PH</i> (see figure 4)	Solar exposure factors							
	E							
	Orientation sector							
	North	North East	East	South East	South	South West	West	North West
0,00	0,62	1,09	1,19	0,96	0,86	1,04	1,30	1,16
0,05	0,69	0,96	1,07	0,85	0,57	0,92	1,19	1,04
0,10	0,63	0,88	1,01	0,79	0,54	0,86	1,11	0,94
0,15	0,57	0,82	0,95	0,75	0,51	0,81	1,05	0,88
0,20	0,51	0,76	0,89	0,70	0,48	0,76	0,99	0,83
0,25	0,46	0,72	0,85	0,67	0,46	0,72	0,95	0,77
0,30	0,45	0,67	0,80	0,64	0,43	0,69	0,90	0,72
0,35	0,42	0,63	0,76	0,60	0,41	0,65	0,85	0,67
0,40	0,39	0,58	0,71	0,57	0,38	0,62	0,81	0,62
0,50	0,37	0,52	0,65	0,52	0,36	0,56	0,73	0,55
0,60	0,35	0,46	0,58	0,47	0,33	0,51	0,65	0,48
0,70	0,32	0,42	0,54	0,43	0,31	0,47	0,59	0,44
0,80	0,30	0,37	0,50	0,40	0,28	0,43	0,52	0,40
0,90	0,28	0,34	0,46	0,37	0,26	0,40	0,49	0,35
1,00	0,26	0,31	0,42	0,34	0,25	0,37	0,46	0,31
1,10	0,25	0,28	0,39	0,32	0,23	0,35	0,43	0,29
1,20	0,24	0,26	0,36	0,30	0,22	0,33	0,40	0,27
1,30	0,23	0,25	0,34	0,28	0,21	0,31	0,37	0,26
1,40	0,21	0,23	0,32	0,27	0,20	0,29	0,34	0,24
1,50	0,21	0,22	0,30	0,25	0,19	0,28	0,32	0,23
1,60	0,20	0,22	0,29	0,23	0,18	0,27	0,30	0,21
1,70	0,19	0,21	0,27	0,22	0,18	0,25	0,29	0,20
1,80	0,18	0,20	0,25	0,21	0,17	0,23	0,27	0,20
1,90	0,18	0,19	0,24	0,21	0,17	0,22	0,26	0,19
2,00	0,17	0,17	0,24	0,21	0,16	0,21	0,25	0,19

Table 4: Solar exposure factors

Glass description	Aluminium / steel		Timber / uPVC	
	Total U-value	SHGC	Total U-value	SHGC
Single clear	7.9	0.81	5.6	0.77
Single tinted	7.9	0.65	5.6	0.61
Single coated	7.8	0.68	5.5	0.64
Single tinted and coated	7.8	0.45	5.5	0.42
Double clear	6.2	0.72	3.8	0.68
Double tinted	6.2	0.57	3.8	0.57
Double coated	6.1	0.60	3.8	0.59
Double tinted and coated	6.1	0.41	3.8	0.37

Table 5: Worst case whole glazing element performance values

The above glazing element values should be used in calculations unless alternative figures from glazing manufacturers that are verified in accordance with ASTM C 1199 and ISO 9050 requirements have been provided.

EN 7 Urban heat island

All external flat hard surfaces including car parking areas and roofing over 500m² must be constructed of a material with an absorptance value lower than 0.6. Where material with a solar reflectance value of more than 0.6 is used for car parking, a minimum area of 30% of the surface area must be shaded.

Colour	Value
Slate (dark grey)	0.9
Red, green	0.75
Yellow, buff	0.6
Zinc aluminium—dull	0.55
Galvanised steel—dull	0.55
Light grey	0.45
Off white	0.35
Light cream	0.3

Table 6: Absorbencies of different colours (SANS 204)

Submission Requirements

1. Provide site plan indicating external hard surface area, annotate key referred to in table below.
2. Provide table indicating external hard surfaces with site plan key references. Areas, respective absorptance values and % shading should be provided, as outline below.

Plan key	Area	Color and absorptance value	% shaded
Car parking	150	0.45	20%

EN 8 Internal lighting power density

Internal lighting power densities should comply with SANS 204 as outlined in the table 6, below.

Submission Requirements

1. Provide table of internal spaces with number of light fittings and respective power ratings. Sum of total lighting power divided by total area of internal space should be provided, as indicated in the table below.

Internal space	Area (m ²)	Type of light fitting	Light fitting power rating	Number of fittings	Total lighting power
Office	30	Fluorescent tube	58	4	232
Bathroom	12	Compact fluorescent	12	2	24
Total	42				256
Lighting power density (Lighting power/area)					6W/m ²

EN 9 Lighting zoning

The maximum internal area that can be controlled with a single switch should not exceed the area indicated under lighting zoning.

Submission Requirements

Class of Occupancy or Building	Occupancy	Internal lighting power density in Watts per m ² (from SANS 204)	Lighting zoning
A1	Entertainment & Public assembly	10	300m ²
A2	Theatrical & indoor sport	10	300m ²
A3	Places of instruction	10	100m ²
A4	Worship	10	200m ²
A5	Outdoor sport is viewed	10	200m ²
B1	High risk commercial	10	200m ²
B2	Moderate risk commercial	24	200m ²
B3	Low risk commercial	20	200m ²

C1	Exhibition Halls	15	300m2
C2	Museums	15	200m2
D1	High risk industrial	5	200m2
D2	Moderate risk industrial	20	200m2
D3	Low risk industrial	20	200m2
D4	Plant rooms	15	200m2
E1	Places of detention	5	200m2
E2	Hospitals	15	100m2
E3	Other institutional residences	10	100m2
F1	Large shops	10	200m2
F2	Small shops	24	100m2
F3	Wholesaler's store	20	200m2
G1	Offices	15	100m2
H1	Hotels	17	100m2
H2	Dormitories	10	100m2
H3	Domestic residences	5	50m2
H4	Dwelling houses	5	50m2
J1	High risk storage	5	200m2
J2	Moderate risk storage	17	200m2
J3	Low risk storage	15	200m2
J4	Parking areas covered	7	200m2

Table 7: Internal lighting power density and zoning

Submission Requirements

1. Provide lighting layout(s) indicating switching arrangements.

EN 10 Internal lighting controls

Lighting controls should be selected to ensure lights are only on when required and are not left on accidentally. The following requirements should be met.

Area	Examples	Lighting controls
Intermittently used areas over 30m ²	Storage areas, bathrooms, meeting spaces and underground parking	Motion sensor
Well daylight useable areas over 200m ² . Good day lighting is defined in HE1	Open plan offices	Photo sensor

Table 8: Internal lighting controls

Emergency or low level background lighting (under 2W/m²) is exempt from this requirement.

Submission Requirements

1. Provide table of internal spaces with lighting controls, as outlined below.

Space	Area (m ²)	Type of switch
Office	30	Manual switch
Bathroom	12	Motion sensor

EN 11 External lighting controls

External lighting should be linked to a photo sensor to ensure that this is switched off when there is adequate daylight. All signage and façade and feature lighting must be on a timer that ensures that this is switched off after 12.00PM (midnight). Exempted occupancies are outlined in the table below.

Submission Requirements

1. Provide table with all external light fittings with type of controls as indicated below.

Area	Type of light fitting	Type of control	Lighting fitting power rating	Number of fittings	Total lighting power
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Parking area	Compact fluorescent	Movement sensor	12	2	24
Signage	Compact fluorescent	Timer	12	2	24
Total power requirements					48
Gross floor area (m ²)					300
External lighting power ratio					0.16W/m ²

EN 12 External lighting power ratio

The amount of external lighting in buildings should be restricted to a maximum external lighting power ratio, as indicated below.

Class of Occupancy or Building	Occupancy	Maximum external lighting power in Watts per gross floor building area m ²	Signage and feature lighting
A1	Entertainment & Public assembly	1	Photo sensor
A2	Theatrical & indoor sport	2	Photo sensor
A3	Places of instruction	1	Photo sensor, timer
A4	Worship	1	Photo sensor, timer
A5	Outdoor sport is viewed	2	Photo sensor, timer
B1	High risk commercial	1	Photo sensor, timer
B2	Moderate risk commercial	1	Photo sensor, timer
B3	Low risk commercial	1	Photo sensor, timer
C1	Exhibition Halls	2	Photo sensor, timer
C2	Museums	2	Photo sensor, timer
D1	High risk industrial	2	Photo sensor, timer
D2	Moderate risk industrial	1	Photo sensor, timer
D3	Low risk industrial	1	Photo sensor, timer
D4	Plant rooms	n/a	Photo sensor, timer
E1	Places of detention	Not applicable	Not applicable
E2	Hospitals	Not applicable	Photo sensor
E3	Other institutional residences	1	Photo sensor, timer
F1	Large shops	1	Photo sensor, timer
F2	Small shops	2	Photo sensor, timer
F3	Wholesaler's store	1	Photo sensor, timer
G1	Offices	2	Photo sensor, timer
H1	Hotels	2	Photo sensor
H2	Dormitories	1	Photo sensor, timer
H3	Domestic residences	1	Photo sensor, timer
H4	Dwelling houses	1	Photo sensor, timer
J1	High risk storage	Not applicable	Not applicable
J2	Moderate risk storage	1	Photo sensor, timer
J3	Low risk storage	1	Photo sensor, timer
J4	Parking areas covered	1	Photo sensor

Table 9: External lighting power density and signage and feature lighting controls

Submission Requirements

1. Provide table with all external light fittings, indicating number and respective power ratings. Sum of total lighting power divided by total area of internal space should be provided, as indicated in the table below.

Area	Type of light fitting	Type of switching	Lighting fitting power rating	Number of fittings	Total lighting power
Parking area	Compact fluorescent	Movement sensor	12	2	24
Signage	Compact fluorescent		12	2	24

Total power requirements	48
Gross floor area (m ²)	300
External lighting power ratio	0.16W/m ²

EN 13 Water heating

All water heating requirements should be met through solar power. This requirement does not apply to buildings over 4 storeys and building that are overshadowed where it can be demonstrated that solar water heaters would not be effective.

Submission Requirements

1. Specification for solar water heater to be installed including volume of hot water storage in litres
2. Indicate solar water heater(s) on roof plan or site layout.

EN 14 Hot water pipes

Hot water pipes should be insulated to comply with SANS 204 and insulation should meet the minimum R-values outline below.

Internal Diameter of Pipe	Minimum R-value
Internal pipe diameter 40mm and less	0.625
Internal pipe diameter exceeding 40mm, but not exceeding 80mm	1.00
Internal pipe diameter exceeding 80mm	1.50
Hot water cylinder or storage	2.00

Table 10. Minimum R-values for pipe insulation

Submission Requirements

1. Specification of hot water pipe insulation indicating R-values

EN 15 Heating, Cooling and Ventilation

Buildings must not exceed maximum heating, cooling and ventilation energy power density and energy consumption figures. Compliance can be demonstrated through either simple calculations to show compliance with power density targets or through modelling to show compliance with energy consumption targets (see below). Compliance through the power density criteria is much simpler to demonstrate and is suitable for low energy and passive buildings. Compliance through energy consumption criteria is more complex and suitable for air conditioned buildings.

Power density compliance

Buildings must not exceed a power density of 10W/m² for heating, cooling and ventilation equipment. Compliance can be demonstrated by dividing the total installed heating, cooling and ventilation equipment (such as ceiling fans) power requirements by the gross floor area.

Submission Requirements

1. Calculate total power requirements of all installed heating, cooling and ventilation equipment in the building and divide this by the gross floor area and indicate the energy power density of the building, as outlined in the below.

Area	Equipment	Equipment power rating W	Number	Total power W
Ventilation and cooling	Ceiling fans	75	4	300
Ventilation	Extract fan	75	1	75
Total power requirements				375
Total building area				200
Energy power density				1.875 W/m ²

Energy consumption compliance

Where the power density for heating, cooling and ventilation equipment exceeds 10W/m² energy consumption must be modelled for the proposed building to achieve predicted annual energy consumption measured in kWh/m².a. Annual energy consumption figures should comply with SANS

204 and should not exceed maximum annual energy consumption figures outlined in table 11 below. Renewable energy generated on site can be subtracted from maximum energy consumption (see table below). Modelling protocols used must comply with SANS 204 requirements.

Occupancy or building	Description	Maximum energy consumption kWh/m ² pa
A1	Entertainment and public assembly	400
A2	Theatrical and indoor sport	400
A3	Places of instruction	400
A4	Worship	115
F1	Large shop (including shopping malls)	245
G1	Offices	190
H1	Hotel	600

Table 11. Maximum annual energy consumption per building classification (from SANS 204)

Submission Requirements

1. Model total predicted energy consumption of the building and divide this by the gross floor area to indicate the building's annual energy consumption per m², as outlined below. Submission should include models and calculations presented clearly and in line with SANS 204 and generally accepted good practice standards.

Equipment	Energy consumption
Internal lighting kWhrs/annum	10,000
HVAC kWhrs/annum	12,000
Hot water kWhrs/annum	2,000
etc	
Total power requirements kWhrs/annum	24,000
Renewable energy generated by photovoltaic panels kWhrs/annum	-4,000
Total power requirements kWhrs/annum	20,000
Total building area (m ²)	200
Annual energy consumption per m ² (kWh/m ² pa)	100

EN 16 Energy Sub metering

All buildings with a gross floor area over 5,000m² should have energy sub metering in order to be able to monitor and control energy use in the building. Sub metering design should be located on all substantial energy consumption areas and include lighting, HVAC and equipment.

Submission Requirements

1. Provide electrical layout indicating sub metering points.

EN 17 Renewable Energy

The proportion of renewable energy used in buildings should be increased over time. This requirement can be met by installing renewable energy systems in buildings or on site. Alternatively, signing long term supply agreements with renewable energy supplier can also be used to meet this requirement.

All new buildings should ensure that at least a portion of their energy requirements will be sourced from renewable energy sources. Plans should also be developed to show how this proportion will be increased to 100% (carbon-neutral building).

Submission Requirements

1. Provide specifications of on-site renewable generation system(s). Provide calculations of generation capacity and indicate this as a proportion (%) of total energy requirements for the building. Solar water heating should not be included in this calculation as it is addressed by separate criteria.

Alternatively

2. Provide a signed renewable energy contract covering a minimum of 5 years supply. Provide calculations that show extent of supply and indicate this as a proportion (%) of total energy requirements in the building.

WA Water

WA 1 Toilet flush

Where flush toilets are installed these must have a dual flush capability. Flush rates must not exceed 4.5L (1/2 flush) and 9L (full flush).

Submission Requirements

1. Provide toilet specification(s) and flush volumes

WA 2 Wash hand basin taps

The flow rate in hand wash basin taps should not exceed 6l/minute.

Submission Requirements

1. Provide hand wash basin tap specification(s) and flow rate volumes

WA 3 Baths

Where baths are installed, a shower fitting should also be provided.

Submission Requirements

1. Provide shower fitting specification
2. Indicate on shower on bathroom layout drawing

WA 4 Showers

Flow rates of shower heads must not exceed 10L/minute.

Submission Requirements

1. Provide shower head specification(s) and flow rate volumes

WA 5 Hot water pipes

Hot water pipe runs from point of hot water generation to delivery device should not exceed 6 running metres.

Submission Requirements

1. Indicate on plan hot water pipe runs from generating device to consumption point(s). Annotate drawing with length of pipe runs, both horizontally and vertically.

WA 6 Rainwater harvesting

In all buildings with a useable area over 200m² the following minimum provision for rainwater harvesting must be made. An onsite rainwater harvesting systems must be installed with the capacity indicated below. This should be linked toilets / irrigation system / other large water consumption areas.

Class of Occupancy or Building	Occupancy	Rainwater Harvesting System (L/M2 of useable area)
A1	Entertainment & Public assembly	5
A2	Theatrical & indoor sport	5
A3	Places of instruction	10
A4	Worship	5
A5	Outdoor sport is viewed	5
B1	High risk commercial	5
B2	Moderate risk commercial	5
B3	Low risk commercial	5
C1	Exhibition Halls	5
C2	Museums	5
D1	High risk industrial	5
D2	Moderate risk industrial	5

D3	Low risk industrial	5
D4	Plant rooms	n/a
E1	Places of detention	5
E2	Hospitals	5
E3	Other institutional residences	5
F1	Large shops	5
F2	Small shops	5
F3	Wholesaler's store	5
G1	Offices	5
H1	Hotels	5
H2	Dormitories	5
H3	Domestic residences	10
H4	Dwelling houses	10
J1	High risk storage	5
J2	Moderate risk storage	5
J3	Low risk storage	5
J4	Parking areas covered	2

Table 12. Rainwater harvesting capacity

Submission Requirements

1. Provide specification or rainwater tank with volume(s). Divide capacity of rainwater tank by useable area to indicate volume of rainwater storage capacity in litres per m2 of building.
2. Indicate rainwater harvesting tank on plan and indicate plumbing connections.

WA 7 Onsite retention

Sites which have over 500m² of hard surface (for instance surface car parking) should demonstrate how 80% of runoff water volume will be retained on site. Retention strategies can include appropriately designed rain water harvesting systems or sustainable urban drainage systems (SUDs) including swales.

Submission Requirements

1. Provide specifications of onsite retention system including absorbance rates and storage volumes
2. Provide calculations to show that onsite retention systems are able to retain 80% of runoff volume
3. Annotated site plan indicating onsite retention systems such as swales, retention ponds etc

WA 8 Swimming and ornamental pools

Water to fill and top up swimming pools and ornamental ponds over 2m³ must be sourced from rainwater harvesting tanks. Municipal supplies should not be used for this purpose. All applications made to develop swimming must indicate that a rainwater harvesting system of adequate capacity to fill and maintain water levels in the swimming pool throughout the year has also been provided

To calculate volumes of water required to top up swimming pools and ornamental ponds an evaporation rate of 2000mm per year should be used. Thus, if the surface area of a swimming pool is 5m², $5 \times 2.0 = 10.0$ m³ (the required capacity of the rainwater harvesting system).

Submission Requirements

1. Indicate swimming pools and rainwater harvesting system on site plan
2. Provide surface area of swimming pool or ornamental pool(s) and carry out calculation to indicate volume of water required to top up pool. Use evaporation rate of 2000mm/year. Provide rain water harvesting capacity provided to meet top-up requirements. Set out information as indicated in table below.

Type of pool	Surface Area (m ²)	Evaporation rate minus rainfall in mm/year (Fixed for Tshwane)	Annual volume of water require to top up pool (Litres)	Rainwater harvesting capacity (Litres)
Swimming	5	2,000	10,000	12,000

WA 9 Irrigation

All water used to irrigate landscapes and planting must be either sourced from rainwater harvesting. Municipal supplies should not be used for this purpose. All applications for development that included irrigation schemes must indicate that a rainwater harvesting system of adequate capacity to meet the irrigation requirements of planting throughout the year has also been provided. Irrigation for food gardens is exempt from this requirement.

Submission Requirements

1. Provide irrigated area, irrigation requirements per week and number of weeks where irrigation will occur to calculate weekly and annual irrigation requirements in litres
2. If rain water harvesting system will be used, indicate annual rain water harvesting capacity, as outlined in table below.

Landscape area	Area (m2)	Irrigation requirements (mm / week)	Weekly water requirements (L)	Number of weeks per year that irrigation is required	Annual water requirements (L)
Front lawn	100	20	2,000	20	12,000
Total annual rain water harvesting capacity (L)					15,000

WE Waste

WE 1 Solid waste

Recycling storage areas should be provided for all buildings with a gross floor area over 500m² or for sites where their total cumulative gross floor area is over 500m² (such as townhouse developments). Recycling storage areas must be covered and located within 50m of a public highway. Where there are a number of units on one site, such as townhouse developments, a single recycling area can be provided, so long as this has adequate capacity (ie total recycling area should not be less than what would be required for individual units). The area for recycling storage should at least meet the requirements below.

Gross floor area of building(s)	Recycling storage area required (as a % of Gross floor area)
0 – 1,000m ²	1
1,000 – 5,000	0.5
5,000 +	0.35 % or provide calculations that area of recycling space provided will accommodate the equivalent of at least 1 week of accumulated waste in order for this to be adequately stockpiled for collection.

Table 13. Recycling storage area requirements

Submission Requirements

1. Indicate recycling storage area provided, as outlined in table below.

Gross floor area of building	Required recycling area (refer to table X)	Recycling storage area provided

2. Indicate recycling storage area on site plan, with dimensions of route to nearest public highway

TR Transport

TR 1 Cycling provision

The provision of secure cycling storage should meet the requirements indicated in the table below.

Submission Requirements

1. Indicate bicycle storage spaces provided, as outlined in table below.

Gross floor area of building / number of seats / number of beds (refer to table x)	Required bicycle parking (refer to table X)	Actual bicycle parking

2. Provide specification of bicycle storage equipment and drawings
3. Indicate bicycle parking on site plan

TR 2 Cycle routes

Cycle routes are clearly designated on roads and provision is made for safe passage at road crossings and junctions and storage.

Submission Requirements

1. Provide specifications and drawings for cycle paths, cycle lanes, crossing points and junctions.
2. Indicate cycle routes on site plan.

TR 3 Car parking

Car parking provision may not exceed City of Tshwane minimum requirements by over 10%.

Submission Requirements

1. Indicate municipal parking requirements and actual provision on site, as outline in the table below.

Gross floor area of building	Municipal parking requirements	Actual parking provision

TR 4 Pedestrian routes

All buildings should have dedicated pedestrian routes from public highways and public transport nodes to the main entrances of buildings with safe road crossing points are provided. Pedestrian routes must comply with SANS 10246.

Submission Requirements

1. Provide specifications and drawings for pedestrian paths, gates and crossing points.
2. Indicate pedestrian routes on site plan.

TR 5 Local facilities

Work environments

Access to the following facilities should be provided within 400m: bank/bank ATM, restaurant/food retail, train station / bus stop / regularly used taxi stop. Where these facilities do not exist within 400m, a plan should be provided to show how local access to these facilities will be achieved.

Submission Requirements

1. On site plan indicate location of required facilities and routes to access these. Indicate lengths of routes on site plan.

Residential environments

Access to the following facilities should be provided within 1000m: crèche, primary school, park, grocery retail, post office, train station / bus stop / regularly used taxi stop regularly used taxi stop. Where these facilities do not exist within 1000m, a plan should be provided to show how local access to these facilities will be achieved.

Submission Requirements

1. On site plan indicate location of required facilities and routes to access these. Indicate lengths of routes on site plan.

Class of Occupancy or Building	Occupancy	Cycling Provision	Local facilities provision requirement
A1	Entertainment & Public assembly	5 per 100 seats	Work environments
A2	Theatrical & indoor sport	5 per 100 seats	Work environments
A3	Places of instruction	30 per 100 learners	Work environments
A4	Worship	5 per 100 seats	
A5	Outdoor sport is viewed	5 per 100 seats	Work environments
B1	High risk commercial	Minimum 1 space, plus 1	Work environments

		space per 1000m ²	
B2	Moderate risk commercial	Minimum 1 space, plus 1 space per 1000m ²	Work environments
B3	Low risk commercial	Minimum 1 space, plus 1 space per 1000m ²	Work environments
C1	Exhibition Halls	Minimum 1 space, plus 2 space per 1000m ²	Work environments
C2	Museums	Minimum 1 space, plus 2 space per 1000m ²	Work environments
D1	High risk industrial	Minimum 1 space, plus 1 space per 1000m ²	Work environments
D2	Moderate risk industrial	Minimum 1 space, plus 1 space per 1000m ²	Work environments
D3	Low risk industrial	Minimum 1 space, plus 1 space per 1000m ²	Work environments
D4	Plant rooms	Not applicable	Not applicable
E1	Places of detention	Minimum 1 space, plus 1 space per 50 beds	Work environments
E2	Hospitals	Minimum 1 space, plus 1 space per 50 beds	Work environments
E3	Other institutional residences	Minimum 1 space, plus 1 space per 50 beds	Work environments
F1	Large shops	Minimum 1 space, plus 2 space per 100m ²	Work environments
F2	Small shops	Minimum 1 space, plus 2 space per 100m ²	Work environments
F3	Wholesaler's store	Minimum 1 space, plus 1 space per 1000m ²	Work environments
G1	Offices	Minimum 1 space, plus 1 space per 100m ²	Work environments
H1	Hotels	Minimum 1 space, plus 1 space per 50 beds	Work environments
H2	Dormitories	Minimum 1 space, plus 1 space per 50 beds	Work environments
H3	Domestic residences	1 space per dwelling	Residential environments
H4	Dwelling houses	1 space per dwelling	Residential environments
J1	High risk storage	1 space per 1000m ²	Work environments
J2	Moderate risk storage	1 space per 1000m ²	Work environments
J3	Low risk storage	1 space per 1000m ²	Work environments
J4	Parking areas covered	1 space per 20 cars	Not applicable

Table 14. Cycling and local facilities provision

HE Health

HE 1 Daylight

Buildings are required to demonstrate that they achieve a daylight factor of 2% at the working plane for at least 80% of the useable area of the building under uniform design sky. This should be demonstrated through modelling. Alternatively, the deemed to satisfy condition can be demonstrated. Here 80% of the useable area must be within 2H of a window where H is the head of a window, as outlined in the diagram below.

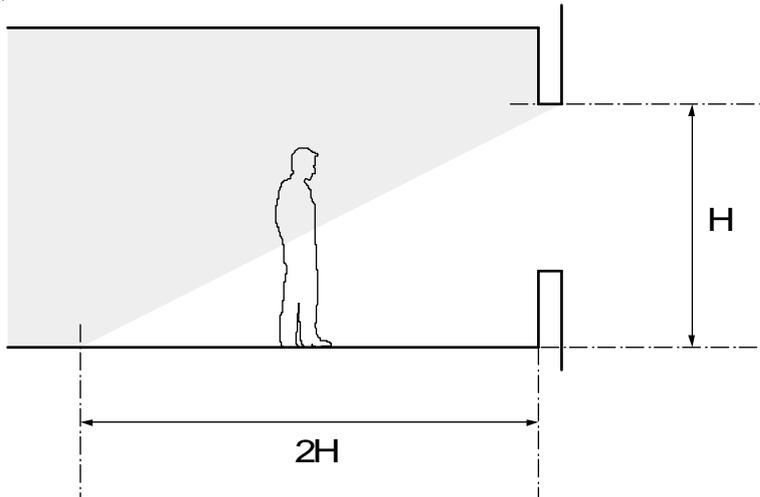


Figure 3: Diagram showing area of high quality daylight

Submission Requirements

1. Provide plans with daylight modelling indicating daylight factor (DF) for useable area under uniform design sky conditions.
2. Alternatively, mark up plans to indicate area within 2H of external window (Daylit area). Divide total daylit area with total useable area and indicate % of useable floor area that is daylit, as outlined in the table below.

A Useable floor area of building	B Area that is 2H from an external window	% of useable area deemed to be adequately daylit (B/A)*100

HE 2 External Views

Buildings are required to demonstrate that they achieve minimum requirements for views from useable areas. These requirements are defined in terms of the proportion of useable area that is within 6m of an external window and has a direct, unobstructed view of this. Minimum areas required are indicated as percentage of useable area with a view as indicated below.

Submission Requirements

1. Provide floor plans marked up to indicate areas with external views.
2. Divide total area with views with total useable area and indicate % of useable floor area that has an external view as outlined in the table below.

A Useable floor area of building	B Area that has an external view	% of useable area deemed to have an external view (B/A)*100

HE 3 Natural ventilation

All useable areas within buildings, whether mechanically ventilated or not, should have openings with an equivalent area of five (5) % of the occupied floor area. These should comply with the requirements of SANS 10400 and be designed to reduce energy requirements for ventilation and air conditioning, when external environments are within the human comfort range (when HVAC systems can be turned down or off) and during power outages.

Submission Requirements

1. Provide window schedule indicating opening areas
2. Provide schedule of useable area with related opening areas. Divide opening area with floor to indicate % ventilation area, as indicated in the table below.

A	B	% of opening area relative to floor area

<i>Floor area</i>	<i>Associated opening area</i>

Class of Occupancy or Building	Occupancy	Views Not applicable / % useable area required to have a view	Daylight Not applicable / % of useable area required to have 2% daylight factor	Natural Ventilation
A1	Entertainment & Public assembly	Not applicable	Not applicable	Not applicable
A2	Theatrical & indoor sport	Not applicable	Not applicable	Not applicable
A3	Places of instruction	80	80	Required
A4	Worship	Not applicable	Not applicable	Required
A5	Outdoor sport is viewed	Not applicable	Not applicable	Required
B1	High risk commercial	80	50	Required
B2	Moderate risk commercial	80	50	Required
B3	Low risk commercial	80	50	Required
C1	Exhibition Halls	Not applicable	80	Required
C2	Museums	Not applicable	Not applicable	Not applicable
D1	High risk industrial	80	50	Required
D2	Moderate risk industrial	80	50	Required
D3	Low risk industrial	Not applicable	80	Required
D4	Plant rooms	Not applicable	Not applicable	Required
E1	Places of detention	80	80	Required
E2	Hospitals	80	80	Not applicable
E3	Other institutional residences	80	80	Required
F1	Large shops	Not applicable	50	Required
F2	Small shops	Not applicable	80	Required
F3	Wholesaler's store	Not applicable	50	Required
G1	Offices	80	80	Required
H1	Hotels	80	50	Required
H2	Dormitories	80	50	Required
H3	Domestic residences	80	80	Required
H4	Dwelling houses	80	80	Required
J1	High risk storage	Not applicable	50	Required
J2	Moderate risk storage	Not applicable	50	Required
J3	Low risk storage	Not applicable	50	Required
J4	Parking areas covered	Not applicable		Required

Table 15. Daylight, views and natural ventilation

7 Submission Form A: Mandatory Standards

Title of Project			
Address of project			
Submitted by	Name	Company	
	Tel	Cell	Email

Occupancy	Building type	Code
Site area (m2)		
Gross floor area (m2)		
Useable area (m2)		

Submission Requirements

Ref	Title	Requirement	Submission requirements	Submission requirements met?	Compliance demonstrated?
ENERGY (EN)					
EN2	Floor plate depth	Building depth must not exceed 15m	Annotated site plan		
EN5	Roof insulation	Roof insulation should comply with SANS 204	Detail section Calculations		
EN7	Urban heat island	Maximum absorptance and shading for external hard surfaces including roofs and external parking	Site plan Schedule with calculation		
EN8	Internal lighting power density	Internal lighting power densities should not exceed maximum values provided	Schedule with calculations		
EN9	Lighting zoning	Area of internal space controlled by single switch should not exceed maximum areas provided.	Schedule with calculations		
EN11	External lighting controls	Signage and feature lighting controls should be comply with requirements	Schedule with calculations		
EN12	External lighting power	External lighting should not exceed maximum power per m2 requirements	Schedule with calculations		
EN13	Water heating	All hot water requirements should be met through solar water heating	Specification Annotated site / roof plan		
EN14	Hot Water pipes	Hot water pipes should be insulated in line with requirements	Specification		
WATER (WA)					
WA 1	Toilet flush	Toilet flush volumes should not exceed maximum volumes indicated	Specification		
WA2	Wash hand basin	Hand wash basin taps do not exceed maximum flow rate indicated	Specification		

WA3	Baths	Baths should be fitted with shower fittings	Specification Bathroom layout drawing		
WA4	Showers	Maximum flow rate for showerheads must not be exceeded	Specification		
WASTE (WE)					
WE1	Solid waste	Minimum area for waste recycling must be provided	Schedule with calculations Annotated site plan		
TRANSPORT (TR)					
TR1	Cycling Provision	Ensure that secure bicycle storage is provided in line with requirements	Schedule with calculations Annotated site plan		
TR2	Cycle routes	Ensure that cycle routes are provided and these meet requirements	Specification Annotated site plan		
HEALTH (HE)					
HE 1	Daylight	Minimum daylight levels must be achieved in useable areas	Annotated floor plans Schedule with calculations		
HE2	Views	Views must be achieved in all useable areas	Annotated floor plans Schedule with calculations		
HE3	Natural ventilation	All useable area must achieve minimum natural ventilation requirements	Schedule with calculations		

Submission Confirmation	
I confirm that the information submitted accurately reflects what will be constructed and any material changes will be submitted for approval. I also confirm that all compliance assessment and calculations have been carried out in line with City of Tshwane Green Building Development Policy.	
Signature	
Name	
Profession	
Professional registration	
CoT Green building registration	
Date	

Assessor Notes			
Decision	Approved	Resubmit, address notes below	Redo submission
Ref	Notes		

8 Submission Form B: Promoted Standards

Title of Project			
Address of project			
Submitted by	Name	Company	
	Tel	Cell	Email

Occupancy	Building type	Code
Site area (m2)		
Gross building area (m2)		
Useable area (m2)		

Submission Requirements

Ref	Title	Requirement	Submission requirements	Submission requirements met?	Compliance demonstrated?
EN ENERGY					
EN1	Orientation	Building must be orientated North	Annotated site plan		
EN3	Floor insulation	Floor insulation should comply with SANS 204	Detailed section Calculations		
EN4	Wall insulation	Wall insulation should comply with SANS 204	Detailed section Calculations		
EN6	Glazing and solar exposure	Glazing should meet the requirements of SANS 204.	Calculations		
EN10	Internal lighting controls	Motion and photo sensor lighting controls should be used for spaces listed	Schedule with calculations		
EN15	Heating ventilation and cooling	Power density and energy consumption meet targets	Schedule with calculations Model with calculations		
EN 16	Energy sub metering	In buildings with a gross floor area over 5,000m2 all substantial energy consumption uses must be sub metered	Drawings		
EN16 7	Renewable energy	A minimum of 10% of the building's energy requirements must be from renewable energy sources.	Specification Calculations Contract.		
WA5	Hot water pipes	Lengths of hot water pipe runs from generating device to consumption should not exceed maximum length	Specification		
WA6	Rain water harvesting	Rain water harvesting provision should be provide in line with requirements	Specification Annotated site plan		
WA7	Onsite retention	Onsite retention requirements should be met	Specification Calculations Annotated site plan		
WA 8	Swimming pools	Water used to fill and top-up swimming pools should be sourced from rainwater harvesting system	Schedule with calculations Annotated site plan		
WA 910	Irrigation	Water used for irrigation should be sourced from rainwater harvesting systems	Schedule with calculations Annotated site plan		

TR TRANSPORT					
TR3	Car parking	Parking provision must not exceed municipal requirements by more than 10%	Schedule with calculations		
TR 4	Pedestrian routes	Pedestrian routes to and between buildings must meet requirements	Specification Annotated site plan		
TR5	Local facilities	Access to local facilities must meet requirements	Annotated locality / site plan		

Submission Confirmation	
I confirm that the information submitted accurately reflects what will be constructed and any material changes will be submitted for approval. I also confirm that all compliance assessment and calculations have been carried out in line with City of Tshwane Green Building Development Policy.	
Signature	
Name	
Profession	
Professional registration	
CoT Green Building registration	
Date	

Assessor Notes			
Decision	Approved	Resubmit, address notes below	Redo submission
Ref	Notes		

9 Green Building Development Incentive Scheme Points

Ref	Title	Possible Points	Actual Points
EN ENERGY			
EN1	Orientation	1	
EN2	Floor plate depth	1	
EN3	Floor insulation	1	
EN4	Wall insulation	1	
EN5	Roof insulation	1	
EN6	Glazing and solar exposure	1	
EN7	Urban heat island	1	
EN8	Internal lighting power density	1	
EN9	Lighting zoning	1	
EN10	Internal lighting controls	1	
EN11	External lighting controls	1	
EN12	External lighting power ratio	1	
EN13	Water heating	1	
EN14	Hot water pipes	1	
EN15	Heating cooling ventilation	3	
EN16	Energy sub metering	1	
EN17	Renewable energy	5	
WA WATER			
WA1	Toilet flush	2	
WA2	Wash hand basin taps	1	
WA3	Baths	1	
WA4	Showers	1	
WA5	Hot water pipes	1	
WA6	Rain water harvesting	3	
WA7	Onsite retention	1	
WA8	Swimming pools	1	
WA9	Irrigation	1	
WE WASTE			
WE1	Solid waste	2	
TR TRANSPORT			
TR1	Cycling provision	1	
TR2	Cycling routes	1	
TR3	Car parking	1	
TR4	Pedestrian routes	1	
TR5	Local facilities	3	
HE HEALTH			
HE1	Daylight	3	
HE2	External views	1	
HE3	Natural ventilation	2	
Total		50	

Notes

1.	Score	Incentive scheme	Key
	0 - 25	Not eligible	Below minimum
	25 - 30	Not eligible	Meets requirements
	30 - 40	Eligible for 1	Surpasses requirement
	40 - 50	Eligible for 2	Excels
2.	All greyed criteria are mandatory		
3.	Where criteria are listed as Not Applicable for a particular occupancy type, points should still be included.		

10 Green Building Development Incentive Scheme Certificate

- S A M P L E -



B1	Building Name	Dumani Residence
B2	Address	321 Maru St
B3	Building type	Dwelling House (H4)
B4	Gross Area	254m ²

Ref	Title	Possible Points	Actual Points
EN ENERGY			
EN1	Orientation	1	1
EN2	Floor plate depth	1	1
EN3	Floor insulation	1	1
EN4	Wall insulation	1	1
EN5	Roof insulation	1	1
EN6	Glazing and solar exposure	1	1
EN7	Urban heat island	1	1
EN8	Internal lighting power density	1	1
EN9	Lighting zoning	1	1
EN10	Internal lighting controls	1	1
EN11	External lighting controls	1	1
EN12	External lighting power ratio	1	1
EN13	Water heating	1	1
EN14	Hot water pipes	1	1
EN15	Heating cooling and ventilation	3	3
EN16	Energy sub metering	1	1
EN17	Renewable energy	5	0
WA WATER			
WA1	Toilet flush	2	2
WA2	Wash hand basin taps	1	1
WA3	Baths	1	1
WA4	Showers	1	1
WA5	Hot water pipes	1	1
WA6	Rain water harvesting	3	0
WA8	Onsite retention	1	1
WA9	Swimming pools	1	1
WA10	Irrigation	1	1
WE WASTE			
WE1	Solid waste	2	2
TR TRANSPORT			
TR1	Cycling provision	1	1
TR2	Cycling routes	1	1
TR3	Car parking	1	1
TR4	Pedestrian routes	1	1
TR5	Local facilities	3	3
HE HEALTH			
HE1	Daylight	3	3
HE2	External views	1	1
HE3	Natural ventilation	2	2
	Total	50	42

Rating

4.2

▣▣▣▣

Submitted by

Mike Murphy

3491

Validated by

Thabo Kgatso

2341

Name

Registration number

Signature

