



**Draft Green Building Development and Net-zero Carbon Building By-law for  
the City of Tshwane**

28 June 2021



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## TITLE

Green Building Development and Net-zero Carbon Building By-law for the City of Tshwane

## DOCUMENT CONTROL

|                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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## **GREEN BUILDING DEVELOPMENT BY-LAW**

The purpose of the Green Building Development By-law is to provide the City of Tshwane Metropolitan Municipality with legislative measures to ensure that a more sustainable built environment is developed, in accordance with the Green Building Development and Net-zero Carbon Policy of the City of Tshwane.

### **PREAMBLE**

Whereas the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996) (the Constitution), read together with the Local Government: Municipal Systems Act, 2000 (Act 32 of 2000) and other various legislation, states that everyone has a right to an environment that is not harmful to their health and well-being;

and whereas the Constitution, 1996 requires the environment to be protected for the benefit of present and future generations through reasonable legislative measures that –

- prevent pollution and ecological degradation;
- promote conservation; and
- ensure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development;

and whereas the Municipal Systems Act, 2000 enjoins local government to ensure that municipal services are provided to communities in a financially and environmentally sustainable manner and promote safe and healthy environments:

be it, therefore, enacted by the City of Tshwane Metropolitan Municipality as follows:

### **DEFINITIONS**

In the Green Building Development and Net-zero Carbon Building By-law, all words and phrases, except for those defined in the by-law, have the same meaning as in the National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977), the National Building Regulations made under the act and the user's code of practice for the application of the National Building Regulations (NBR), namely the South African National Standard (SANS) 10400 or South African Bureau of Standards (SABS) 0400:1990. Thus, unless the context indicates otherwise –

**Approved** means approved in writing by the City of Tshwane or an authorised agent;

**Constitution** means the Constitution of the Republic of South Africa, 1996;

**Competent person** means a person who is qualified by virtue of his/her education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him/her in terms of the National Building Regulations<sup>1</sup>;

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<sup>1</sup> As defined in SANS 10400 Part A

**Council** means the Council of the municipality, referred to in Chapter 7 of the Constitution, 1996, of the City of Tshwane, established in terms of the Local Government: Municipal Structures Act, 1998 (Act 117 of 1998), read with Government Notice 1866 published in *Provincial Gazette* Extraordinary 128 of 30 June 2010, as amended;

**Green Building Development and Net-zero Carbon Building Policy** means a policy developed by the City of Tshwane in order to support the development of a more sustainable built environment;

**Green building** means a building that, in its design, construction and operation, reduces or eliminates negative impacts and can create positive impacts on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life<sup>2</sup>;

**Incentives** means inducements and support, financial or otherwise, that may be offered to encourage the development of a more sustainable built environment;

**Mandatory standards** means standards that the City of Tshwane has made compulsory and which must be achieved for approval of a building plan;

**Municipal Systems Act, 2000** means the Local Government: Municipal Systems Act, 1998 (Act 117 of 1998), read with its regulations, as amended;

**Municipality** means the corporate administration of the City of Tshwane, which has exclusive executive and legislative authority within the Tshwane jurisdictional area, as described in Section 155(1) of the Constitution, 1996, established by Provincial Notice 6766 of 2000 dated 1 October 2000, as amended, in terms of the Municipal Structures Act, 1998 (Act 117 of 1998), and includes –

- a structure, official or other person that exercises a delegated authority or power or carrying out a function in terms of this by-law, or any power delegated in terms of the Corporate System of Delegations of the City, provided for in Section 59 of the Municipal Systems Act, 2000; or
- a service provider or agent that fulfils a responsibility under this by-law, assigned to it in terms of Section 81(2) of the Municipal Systems Act, 2000 or any other contractual assignment or law, and any amendments thereto after the date of commencement, as the case may be, and the “City” will have the same meaning;

**National Building Regulations** means the National Building Regulations made in terms of the National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977), as amended;

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<sup>2</sup> This definition is as per the World Green Building Council and is aligned with the local definition of the Green Building Council South Africa; [<https://www.worldgbc.org/what-green-building#:~:text=A%20'green'%20building%20is%20a,improve%20our%20quality%20of%20life>. Accessed 1 February 2021]

**Net-zero carbon building** means a building that is highly energy-efficient by design, with the energy used drawn from renewable energy sources, whether on site or off site, so that there is a net-zero carbon emission on an annual basis;

**Premises** means any piece of land, the external surface boundaries of which are delineated on –

- a general plan or diagram registered in terms of the Land Survey Act, 1997 (Act 8 of 1997), or in terms of the Deeds Registries Act, 1937 (Act 47 of 1937); or
- a sectional plan registered in terms of the Sectional Titles Act, 1986 (Act 95 of 1986); or
- a register held by a tribal authority or in accordance with a sworn affidavit made by a tribal authority;

**Promoted standards** means voluntary standards that the City of Tshwane encourages and supports in order to improve the sustainable performance of the built environment; and

**Town-planning Scheme** means the said scheme, as amended by Council from time to time.

## **1. SCOPE OF THE BY-LAW**

- (1) This by-law is supplementary to the National Building Regulations (NBR) and applies to all development that requires City of Tshwane building plan approval, as defined in the NBR.
- (2) This by-law is also supplementary to existing City of Tshwane by-laws on solid waste, sanitation, electricity and water supply, and land use; that is, it is not designed to supersede or amend these in any way.

## **2. GENERAL PROVISIONS**

- (1) All developments that require City of Tshwane Site Development Plan (SDP), Landscape Development Plan (LDP) and building plan approval, as defined in the Tshwane Town-planning Scheme and NBR, must comply with the mandatory standards, as applicable, as contemplated in Schedule I of this by-law, as amended from time to time.
- (2) The development may also comply with promoted standards, as contemplated in Schedule I of this by-law.
- (3) Compliance with the mandatory standards must be demonstrated to achieve City of Tshwane SDP and building plan approval. Requirements for demonstrating compliance are outlined in Schedule I.
- (4) Demonstrated compliance with the mandatory and promoted standards, as per Schedule I, may qualify the applicant to apply for a City of Tshwane Green Building Development Certificate, which may be developed as Schedule II of this by-law. Such a certificate may be displayed on the building and may qualify the certificate holder to apply for certain incentives.
- (5) Demonstrated compliance with the mandatory or promoted standards in Schedule I may be used to apply for incentives that are managed or promoted by the City of Tshwane, which incentives may be further detailed in Schedule III of this by-law.
- (6) Compliance with both the mandatory and promoted standards must be demonstrated through appropriate documentation, as detailed in Schedule I.
- (7) Issuing of an occupation certificate is dependent upon completion of the works carried out in accordance with the approved SDP and building plan with regard to the applicable mandatory and promoted standards.
- (8) The duty to confirm compliance with both mandatory and promoted standards rests with the City of Tshwane Built Environment and Enforcement Division of the Economic Development and Spatial Planning Department.



- (9) The actual energy consumption of a building with an approved building plan in accordance with the energy efficiency requirements set out in Schedule I may be monitored according to methodology to be developed and included in a schedule to this by-law.

### **3. NON-COMPLIANCE**

- (1) Failure to comply with mandatory standards set out in Schedule I of this by-law will result in non-approval of the SDP, where applicable, and non-approval of the building plan in terms of the NBR.
- (2) Failure to comply, and appeals, may be addressed and remedied through the same instruments and powers vested in local authorities for ensuring compliance with the NBR and the Tshwane Town-planning Scheme.
- (3) Failure to comply with the mandatory standards set out in Schedule I, if not rectified, constitutes an offence.

### **4. OFFENCES, PENALTIES AND FINES**

- (1) Any person convicted of an offence in terms of this by-law shall be liable to be sentenced to three years imprisonment or a fine of up to R60 000,00 (sixty thousand rand), or both such fine and imprisonment. The court, where it deems appropriate, may determine a higher fine in terms of the Adjustment of Fines Act, 1991 (Act 101 of 1991).

### **5. COMMENCEMENT AND TITLE**

- (1) This by-law is called the City of Tshwane Green Building Development and Net-zero Carbon Building By-law.
- (2) This by-law shall come into effect six months after the date of publication in the *Provincial Gazette*. This by-law will be brought into effective application according to an implementation plan that will be developed.
- (3) The schedules to this by-law may be amended from time to time as deemed necessary by the City to ensure continuous advances in research, technology and targets relating to building sustainability, net-zero carbon and climate resilience.

## SCHEDULE I

### DEFINITIONS

In the context of this by-law, the following definitions apply:

**Aged solar reflectance index:** Solar reflectance index (SRI) that is measured after a specified time period (years) to account for change in material colour and other properties (such as dirt accumulation) over time that influence the SRI.

**Alternative water:** Water that is not from the municipal supply and could include greywater and/or rainwater.

**Baseload energy use intensity:** Energy consumption of a building per annum in kWh, expressed with reference to the floor area (m<sup>2</sup>) [kWh/m<sup>2</sup>/a], calculated at the design stage and taking only fixed building services into account, including lighting, space heating and cooling, vertical transport and hot water, excluding operational loads.

**Building envelope:** The elements of a building that separate a habitable room from the exterior of a building or a garage or storage area.

**Competent person:** A person who is qualified by virtue of his/her education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him/her in terms of the NBR<sup>3</sup>.

**Construction waste:** Waste building material and rubble generated on a site as a result of the construction process.

**Contractor:** A person or firm that undertakes a contract to provide materials or labour to provide a service or do a job.

**Demand-type tap:** A tap that only flows while the mechanism is being depressed.

**Demolition waste:** Building materials and rubble generated on a site as a result of demolishing a structure on a site.

**Drinking water:** Water that meets drinking quality as per the South African National Standard (SANS) 241-1.

**Energy efficiency:** Energy consumption of a building per annum in kWh, expressed with reference to the floor area (m<sup>2</sup>) [kWh/m<sup>2</sup>/a].

**Energy submetering:** Submetering enables one to fine-tune operational procedures to minimise consumption and to detect any operational problems early.

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<sup>3</sup> As defined in SANS 10400 Part A

**Greywater harvesting:** The collection of wastewater from bathtubs, showers, hand wash basins, clothes washers and laundry tubs, which can then be processed into reusable water for other non-potable purposes such as irrigation, flushing water closets and urinals.

**Hardscape:** Non-permeable or paved surfaces of a building site (excluding buildings), including areas such as roads, driveways, parking lots, walkways and courtyards.

**Metered-type tap:** A tap that self-closes after a certain period of time.

**Non-motorised transport:** Transport by any mode other than a motor vehicle including, but not limited to, walking, cycling and animal-drawn vehicles, and for the purposes of this by-law it also includes electric vehicles<sup>4</sup>.

**Operational energy:** The energy required during the entire service life of a structure, such as lighting, heating, cooling and ventilating systems, including operating building appliances.

**Operational waste:** Waste generated during the normal operation of a building and that is liable to be disposed continuously or periodically.

**Potable water:** Drinking water that is safe for human consumption as per SANS 241-1.

**Rainwater harvesting:** The collection of water from natural precipitation, which can be treated into potable water for drinking or other purposes such as irrigation, toilet flushing, etc.

**Renewable energy:** Energy derived from solar radiation, wind, waves, tides, biogas, biomass or geothermal energy.

**Solar reflectance:** A measure of the ability of a surface material to reflect sunlight and limit heat island impacts.

**Solid waste:** Waste, refuse or rubbish that is generated by occupants during the use of a building.

**Stormwater management:** Managing all runoff on a site as a resource such that it may be reused on-site or by users downstream and will support the long-term ecological objectives in the receiving drainage network.

**Stormwater plan:** A site plan that indicates the municipal stormwater connection point and the flow of stormwater across the site and off the roof(s) to stormwater collection points (such as a tank) or discharge points (such as a municipal stormwater connection or discharge to the road or adjacent property).

**Urban heat island:** Urban area that is warmer than the surrounding rural area.

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<sup>4</sup> Definition adapted from the Department of Environmental Affairs, Forestry and Fisheries and Department of Transport Model, Generic By-laws on Non-motorised Transport, Final Draft, 19 October, 2019

**Vegetative roof:** A roof that supports soil and live vegetation. Such a roof is to be suitably designed structurally and with waterproofing and must be designed to be easily accessed for maintenance and irrigation purposes.

## CLIMATE RESILIENCE AND ADAPTATION

### Adaptation 1: Urban heat island

The purpose of this requirement is to mitigate the increasing surface temperature in Tshwane and improve the thermal performance of the building envelope. The aim is to reduce the cooling energy required in the building and to positively influence the microclimate.

#### Mandatory standard

For all building types, the following treatment must be applied to mitigate the build-up of heat on a site:

- At least 50% of all site hardscape must either –
  - be shaded;
  - have an aged SRI of at least 55%; or
  - be a combination of both of the above, so that when combined, at least 50% of the site hardscape has been treated.

and

- The roof must be such that –
  - at least 50% of the total roof area on the site will have an aged SRI of at least 55%; or
  - at least 30% of the roof area will be a vegetative roof.

*Hardscape area calculation:*

*Total hardscape area (all kinds of paving, etc. combined) = HS (m<sup>2</sup>)*

*Area of hardscape shaded by trees = HS<sub>shade</sub>*

*Area of hardscape with SRI at least 55% = HS<sub>SRI</sub>*

*Area of hardscape treated = HS<sub>treat</sub> = HS<sub>shade</sub> + HS<sub>SRI</sub>*

*Percentage hardscape treated = (HS<sub>treat</sub> / HS) × 100%*

Hardscape shading may be in the form of a planted trellis, trees (preferably waterwise and indigenous), shade netting or solid roofing. If solid roofing is used to shade site hardscape (such as a carport), the area of such a roof must be added to the total roof area to which mitigation measures are applied. Where trees are used for shading, the shaded area must be calculated based on a ten-year growth canopy and must only include the area directly beneath the tree canopy.

Photovoltaic (PV) panels must not be counted as hardscape or roof area. The total roof area must exclude areas covered by solar PV panels, roof lights, equipment and equipment openings (such as mechanical plant equipment and ventilation openings), but must include uncovered balconies or roof slabs that serve as usable space (such as a patio).

Vegetative roofs must be designed by a competent person, who must ensure that the structural design and waterproofing is suitable.

The SRI of hardscape and roofing materials must be calculated according to SANS 1980:2015.

The following table provides some typical SRI values for materials for guidance purposes.

| <b>SRI for typical materials</b>                           |                          |                  |                          |                  |                    |                 |
|------------------------------------------------------------|--------------------------|------------------|--------------------------|------------------|--------------------|-----------------|
| <b>Example of SRI values for generic roofing materials</b> | <b>Solar reflectance</b> |                  | <b>Thermal emittance</b> |                  | <b>Initial SRI</b> | <b>Aged SRI</b> |
|                                                            | <b>Initial</b>           | <b>Weathered</b> | <b>Initial</b>           | <b>Weathered</b> |                    |                 |
| <b>Grey EPDM</b>                                           | 0,23                     | 0,22             | 0,87                     | 0,87             | 22                 | 20              |
| <b>Grey asphalt shingle</b>                                | 0,22                     | 0,21             | 0,91                     | 0,91             | 22                 | 21              |
| <b>Unpainted cement tile</b>                               | 0,25                     | 0,23             | 0,9                      | 0,9              | 26                 | 23              |
| <b>White granular surface bitumen</b>                      | 0,26                     | 0,24             | 0,92                     | 0,92             | 28                 | 26              |
| <b>Red clay tile</b>                                       | 0,33                     | 0,28             | 0,9                      | 0,9              | 36                 | 30              |
| <b>Light gravel on a built-up roof</b>                     | 0,34                     | 0,29             | 0,9                      | 0,9              | 38                 | 31              |
| <b>Aluminium roof</b>                                      | 0,61                     | 0,47             | 0,25                     | 0,25             | 49                 | 23              |
| <b>White-coated gravel on a built-up roof</b>              | 0,65                     | 0,49             | 0,9                      | 0,9              | 79                 | 58              |
| <b>White coating on metal roof</b>                         | 0,6                      | 0,46             | 0,85                     | 0,85             | 71                 | 52              |
| <b>White EPDM</b>                                          | 0,69                     | 0,52             | 0,87                     | 0,87             | 84                 | 61              |
| <b>White cement tile</b>                                   | 0,73                     | 0,54             | 0,9                      | 0,9              | 90                 | 64              |
| <b>White coating: One coat, 8 mm</b>                       | 0,8                      | 0,59             | 0,91                     | 0,91             | 100                | 71              |
| <b>White PVC</b>                                           | 0,83                     | 0,61             | 0,92                     | 0,92             | 104                | 74              |
| <b>White coating: Two coats, 20 mm</b>                     | 0,85                     | 0,62             | 0,91                     | 0,91             | 107                | 10              |
| <b>Dark-coloured roof</b>                                  | 0,1                      | 0,14             | 0,88                     | 0,88             | 5                  | 10              |
| <b>Medium-coloured roof</b>                                | 0,25                     | 0,23             | 0,88                     | 0,88             | 25                 | 22              |
| <b>Light-coloured roof</b>                                 | 0,4                      | 0,33             | 0,88                     | 0,88             | 45                 | 35              |
| <b>New galvanising</b>                                     | 0,61                     | 0,47             | 0,04                     | 0,04             | 46                 | 19              |
| <b>Aluminium or zinc polished</b>                          | 0,9                      | 0,66             | 0,04                     | 0,04             | 101                | 47              |

|                                                                                                                                                                                |      |      |     |     |     |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----|-----|-----|----|
| <b>Anodised aluminium</b>                                                                                                                                                      | 0,86 | 0,63 | 0,8 | 0,8 | 107 | 74 |
| Source: LBNL Cool Roofing Materials Database, ASHRAE 90.1 and THERM 7.4.3 These values are for reference only and are not for use as substitutes for actual manufacturer data. |      |      |     |     |     |    |

## Submission requirements

For building developments requiring an SDP or LDP, this standard must be demonstrated on those and on the building plan. Where an SDP or LDP is not required, this standard must be demonstrated on the building plans. Compliance with this standard must be demonstrated on the submitted plan(s) by indicating, with hatching, the areas of the site that are covered with hardscape and indicating, with an alternative hatching, the areas that are treated either with shading or have a suitable SRI. The treated areas must be annotated, indicating the square meters and the percentage of the hardscape area that is treated. This must also be indicated on the template.

The portion of the roof that is treated, either with vegetation or material with suitable SRI, must be indicated with hatching on the roof plan and annotated indicating the square meters and the percentage of the total roof area. This must also be indicated on the template.

### Template example

| A                                | B                                                 | C                              | D                                               | E                 |                 |         |
|----------------------------------|---------------------------------------------------|--------------------------------|-------------------------------------------------|-------------------|-----------------|---------|
| Surface description and material | Total area (m <sup>2</sup> ) of hardscape or roof | Hardscape area that is treated | Percentage of treated area<br>(C / B) × 100 = % | Type of treatment |                 |         |
|                                  |                                                   |                                |                                                 | Aged SRI          | Vegetative roof | Shading |
| Paving:<br>cement brick          | 100 m <sup>2</sup>                                | 60 m <sup>2</sup>              | 60%                                             |                   |                 | x       |
|                                  |                                                   |                                |                                                 |                   |                 |         |
| Roof                             | 150 m <sup>2</sup>                                | 100 m <sup>2</sup>             | 67%                                             |                   | x               |         |

The building control professional must evaluate the SDP or LDP (if applicable) and the building control officer must evaluate the site plan and roof plan of the building plans to confirm that the correct percentage areas of the hardscape and roof are suitably treated and that the means of treatment is specified in the template and on the plans. The site inspector must inspect the construction site at a suitable phase to confirm that the hardscape and roofing, as built on-site, are according to the plan.

## Adaptation 2: Rainwater harvesting

The purpose of this requirement is to ensure non-potable water reserves during times of water shortage and to contribute towards reducing the consumption of municipal water supply.

## Promoted standard

Where this standard is applied, provision must be made for rainwater harvesting and on-site water storage.

Projected occupancy and functions within the building must be used to design systems. As a minimum, the rainwater storage tank must be designed to provide at least five days of water supply at a rate of 80 ℓ per day per full-time equivalent (FTE) occupant, assuming an annual rainfall of 500 mm.

Where stored water is used for drinking, it must be suitably treated (according to SANS 241) and tested by a suitable authority. Where it is used for non-potable functions, such as irrigation or toilet flushing, signage must be installed on all taps and on the storage tank stating: "Non-potable water. Do not drink." Such signage must be legible, permanent and of a durable material.

## Submission requirements

For building developments requiring an SDP, and where this standard is applied, this standard shall be demonstrated on the SDP and on the building plans. Where an SDP is not required, this standard must be demonstrated on the building plans. Compliance with this standard must be demonstrated by indicating the rainwater harvesting system on the SDP (where applicable) and the building plan. The rainwater catchment area(s), such as the applicable roof area or other hardscape area, must be indicated with hatching on the SDP (where applicable) and the building plan and the area in square meters must be indicated. The location and size (volume in litres) of the water storage tank(s) must be indicated on the SDP (where applicable) and building plan. There must be a note on the SDP (where applicable) and building plan specifying the position and wording of the signage to be provided.

The following calculations must be included on the plans:

- To calculate the size of the storage tank required:

$$\text{Number of occupants} = N$$

$$\text{Occupancy rate (number of hours of occupancy / 24 hours)} = R$$

$$\text{Full-time equivalent number of occupants} = Nr = N \times R$$

$$\text{Required storage capacity (litres)} = \ell = Nr \times 5 \text{ (days)} \times 80 \text{ (litres per person per day)}$$

Storage capacity provided on-site must be more than or equal to the required storage capacity (ℓ).

- To calculate whether the catchment area (for example the roof) is large enough to supply the storage tank, assuming a rainfall of 500 mm per annum:

$$\text{Catchment area (m}^2\text{)} = A$$

$$\text{Catchment capacity (litres) per annum} = A_{cap} = A \times 500 \text{ mm}$$



Catchment capacity,  $A_{cap}$ , must be more than or equal to the required storage capacity (ℓ).

If the water will be treated to potable standard, this must be stipulated in a note on the plan, including the treatment standard and method. A template table must be completed as part of the submission documentation, indicating the number of FTE occupants, rainwater catchment areas and storage volumes.

#### Template example

| A                   | B                         | C                                   | D                                      | E                             | F                                                             | G                                          | H                                                   | I                                          | J                              |
|---------------------|---------------------------|-------------------------------------|----------------------------------------|-------------------------------|---------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------|--------------------------------------------|--------------------------------|
| Number of occupants | Occupancy rate (0 to 1.0) | Full-time equivalents (FTE) (A x B) | Water consumption per FTE day (litres) | Days of stored water required | Required volume of stored water required (litres) (C x D x E) | Rainwater catchment area (m <sup>2</sup> ) | Rainwater catchment capacity per annum (500 mm x G) | Storage capacity in litres per FTE (H / C) | Tank capacity provided on plan |
| 6                   | 0,6                       | 3,6                                 | 80                                     | 5                             | 1 440                                                         | 50                                         | 25 000 ℓ                                            | 6 944                                      | 2 000 ℓ                        |

The building control professional must evaluate the SDP (if applicable) and the building control officer must evaluate the building plans to confirm that the rainwater catchment capacity (column H) is more than or equal to the required volume (Column F) and that the volume of the tank(s) provided on the site (Column J) is more than or equal to the required volume (Column F) on the plan and on the template. The site inspector must inspect the construction site at a suitable phase to confirm the rainwater tank installed on the site is of the same volume as the one indicated on the approved plans.

### Adaptation 3: Drinking water

The purpose of this requirement is to alleviate heat stress and dehydration during periods of extreme heat in Tshwane.

#### Mandatory standard

Building types A1.1, A1.2, A2.1, A2.2, A3.1, A3.3, A4.1, A4.2, E1, A3.3, E1, E2.1, E2.2, E2.3, E2.4, E3, E4, F1, F2, G1.1, G1.2, G1.3, H1.1 and H2 must have water points where drinking water can be accessed easily. Points must provide for drinking water and filling of bottles.

Demand-type taps must be used and provision must be made for people with disabilities. At least one water point per 100 building occupants must be provided.

This shall be calculated using the following formula:

$$\text{Number of occupants} = N$$

$$\text{Number of water points} = (N / 100) \text{ rounded up to nearest whole number}$$

For example, a school with 1 000 learners must have at least ten water points.

Water points must be provided in areas where food is consumed, where people exercise and on main circulation routes in and/or around the building.

### Submission requirements

Demand-type taps and wastewater drainage must be shown on the building plans with calculations in the standardised format of the template below, demonstrating that the required number of points have been provided.

#### Template example

| A                    | B                          | C                                          | D                                                                                         | E                                       |
|----------------------|----------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>Building type</b> | <b>Number of occupants</b> | <b>Number of occupants, divided by 100</b> | <b>Number of drinking taps required (Column C rounded up to the nearest whole number)</b> | <b>Number of drinking taps provided</b> |
| G1.2                 | 150                        | $150 / 100 = 1,5$                          | 2                                                                                         |                                         |

The building control officer must evaluate the plans and template to confirm that the calculations in the template are correct, that the number of taps provided (Column E) are more than or equal to the number required (Column D) and that the number of drinking taps indicated on the plan is the same as or more than the number required indicated in Column D. The site inspector must inspect the construction site at a suitable phase to confirm that taps installed on-site are in accordance with the approved plan.

### Adaptation 4: Stormwater management

The purpose of this requirement is to ensure the long-term management of stormwater as a resource, prevent and/or mitigate erosion, protect the quality and quantity of stormwater drainage into natural watercourses, support traffic and pedestrian safety and convenience, and prevent and/or mitigate flooding during extreme weather events.

#### Mandatory standard

Any site development activity must provide a stormwater drainage plan developed by a professional engineer and must be included in the SDP. This standard is not applicable where an SDP is not a requirement.

The stormwater plan must show how erosion, the overcharging of municipal stormwater drainage systems and flooding will be avoided through measures such as sustainable urban drainage systems, by which run-off from non-porous hardscape is controlled and/or porous surfaces are provided to retain water and/or stormwater is harvested, in accordance with the South African Guidelines for Sustainable Drainage Systems (WRC Report TT 558/13, May 2013).

## **Submission requirements**

For building developments requiring an SDP, this standard must be demonstrated on the SDP and on the building plan.

The stormwater connection points (if connected to municipal stormwater infrastructure) must be shown on the plan and a report and plan by the professional engineer must be submitted, indicating the stormwater management measures that are planned.

The building control professional must evaluate the SDP and the building control officer must evaluate the building plan to confirm that a plan and report has been submitted by the appointed professional engineer and that the stormwater plan has been accepted by the City's Roads and Transport Department. The site inspector must check that the stormwater system on-site is in accordance with the approved plan.

## **ENERGY**

### **Energy 1: Baseload energy use intensity**

The purpose of this requirement is to ensure a high level of energy efficiency in buildings, which is the first step towards net-zero carbon buildings.

#### **Mandatory standard**

The baseload energy use intensity (EUI) of the building must be –

- as stipulated in Table 1 for the year of construction; or
- where a building does not have building services, such as lifts and heating, ventilation and air conditioning (HVAC), for which the energy consumption can be determined by design, substantial energy efficiency improvement will be deemed to be achieved where –
  - the water heating for 100% of the hot water requirement is provided by a non-electrical resistance heating system;
  - the lighting power density is as per SANS 10400 Part XA until 2024 and from 2025 onwards, the lighting power density is 30% less than that stipulated in SANS 10400 Part XA; and
  - all other deemed-to-satisfy requirements of SANS 10400 Part XA are followed.

For additions or alterations, only that portion of the building that is new shall be required to comply.

**Table 1: Design EUI per building type showing progressive targets, relative to the year of construction**

| Occupancy             | Class of occupancy or building | Occupancy description                                                                                                          | EUI (kWh/m <sup>2</sup> /annum*) |      |        |
|-----------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|--------|
|                       |                                |                                                                                                                                | 2021                             | 2025 | 2030** |
| Public gatherings     | A1.1                           | Venues where people gather for sedentary behaviour                                                                             | 80                               | 56   | 36     |
|                       | A1.2                           | Venues where people gather for non-sedentary behaviour                                                                         | 120                              | 84   | 54     |
|                       | A2.1                           | Theatres and cinemas                                                                                                           | 95                               | 67   | 43     |
|                       | A2.2                           | Sport performance venues                                                                                                       | 120                              | 84   | 54     |
| Places of instruction | A3.1                           | Conference halls, auditoriums, lecture halls, instruction venues, research laboratories, intermediate-scale places of learning | 95                               | 67   | 43     |
| Schools               | A3.3                           | Urban, suburban and rural locations                                                                                            | 55                               | 39   | 25     |
| Places of worship     | A4.1                           | Large venues                                                                                                                   | 50                               | 35   | 23     |
|                       | A4.2                           | Small venues                                                                                                                   | 45                               | 32   | 20     |
| Places of detention   | E1                             | Places of detention                                                                                                            | 55                               | 39   | 25     |
| Hospitals             | E2                             | Large hospitals and medium- to short-stay facilities                                                                           | 175                              | 123  | 79     |
|                       | E2                             | Day hospitals and clinics                                                                                                      | 90                               | 63   | 41     |
|                       | E3                             | Institutional (residential)                                                                                                    | 120                              | 84   | 54     |
|                       | E4                             | Healthcare                                                                                                                     | 85                               | 60   | 38     |
| Retail                | F1                             | Large shops (more than 250 m <sup>2</sup> )                                                                                    | 145                              | 102  | 65     |
|                       | F2                             | Small shops (less than 250 m <sup>2</sup> )                                                                                    | 80                               | 56   | 36     |
| Offices               | G1                             | Large multistorey office buildings                                                                                             | 95                               | 67   | 43     |
|                       | G1                             | Standalone buildings in office parks                                                                                           | 80                               | 56   | 36     |
|                       | G1                             | Call centres                                                                                                                   | 145                              | 102  | 65     |
| Residences            | H1                             | Hotels                                                                                                                         | 145                              | 102  | 65     |
|                       | H2                             | Dormitories                                                                                                                    | 70                               | 49   | 32     |
|                       | H3                             | Domestic residences                                                                                                            | 70                               | 49   | 32     |
|                       | H4                             | Houses (other than Category 1)                                                                                                 | 70                               | 49   | 32     |
|                       | H5                             | Hospitality facilities                                                                                                         | 70                               | 49   | 32     |
| Other                 |                                | Category 1 building (less than 80 m <sup>2</sup> )                                                                             | 70                               | 49   | 49     |

\* *Baseload EUI is based on a pathway developed by Sustainable Energy Africa with progressive increase in energy efficiency in buildings from the baseline annual energy consumption given in SANS 10400 Part XA for Climate Zone 5. It is to be noted that these figures are for the building baseload and not the operational load.*

\*\* *The baseload EUI stipulated for 2030 and onwards is subject to revision based on data to be collected through operational monitoring of new buildings.*

## Submission requirements

Compliance must be shown by one of the following means:

The position of the services, including a lighting layout, must be shown on the plan and the energy consumption of building services must be indicated in the following template, with the total EUI indicated and verified by an appointed competent person:

|                                                         |                                                           |
|---------------------------------------------------------|-----------------------------------------------------------|
| <b>Building or occupancy type:</b>                      |                                                           |
| <b>Target EUI (kWh/m<sup>2</sup>/a) as per Table 1:</b> |                                                           |
| <b>Service</b>                                          | <b>EUI (kWh/m<sup>2</sup>/a)</b>                          |
| Lifts                                                   | (eg 3 800 kWh/a)                                          |
| Escalators                                              |                                                           |
| HVAC system                                             |                                                           |
| Water heating                                           |                                                           |
| Lighting                                                | <i>(Sum of watts for lighting in kW × hours per year)</i> |
| Other                                                   |                                                           |
| <b>Total kWh:</b>                                       |                                                           |
| <b>Usable floor area (m<sup>2</sup>):</b>               |                                                           |
| <b>Total kWh/m<sup>2</sup>/a:</b>                       | <i>(Total kWh/a / usable area)</i>                        |

The position of the services, including a lighting layout, must be shown on the plan. The baseload EUI established through the use of software<sup>5\*</sup> must be demonstrated through the software-generated report, recorded in the bottom row (total kWh/m<sup>2</sup>/a) of the standard template and verified by a competent person. If software is used to demonstrate compliance, it is not necessary to complete the template for each service.

The lighting layout must be shown on the building plan and the total lighting power density (W/m<sup>2</sup>) must be indicated on the template. The lighting power density must be calculated by adding together the connected lighting energy demand for the building and dividing this total by the net floor area. This must also be indicated on the template (in kWh/m<sup>2</sup>) and in the bottom row (total) of the template (in kWh/m<sup>2</sup>/a). The position of the water heating system must be indicated and specified on the plans and all SANS 10400 Part XA deemed-to-satisfy requirements must be demonstrated.

The building control officer must evaluate the plans and check that all services are indicated on the plan and that the information recorded in the template and the software report, where applicable, complies with the requirements of this standard and corresponds to the plan. The site inspector must confirm that the installations are according to the plan and the appointed competent person must verify the same.

## Energy 2: Renewable energy

<sup>5</sup> \*Software such as the EDGE Building App

The purpose of this standard is to ensure the use of renewable energy (RE) sources, whether on-site or off-site, to achieve net-zero carbon buildings and to facilitate future retrofitting of renewable systems.

### Mandatory standard

RE must be provided, on-site or off-site, for the portion of the predicted operational energy load indicated in Table 2. For major alterations and additions, this is applicable only to the portion of the building that forms part of the works, except categories H3 and H4, which are exempt for alternations or additions. Buildings constructed before 2030 must make provision for future installations of RE in the following ways:

- The distribution board must be designed and installed to facilitate the future addition of RE.
- Space for battery storage (if applicable for the planned system) must be provided in a suitable location.
- The position of future on-site RE installation, such as PV panels, must be indicated on the plan.

**Table 2: Percentage of RE to be supplied to a building, relative to the year of construction**

| Occupancy             | Occupancy class | Occupancy description                                                                                                          | Percentage of annual demand met through RE |                                         |
|-----------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------|
|                       |                 |                                                                                                                                | Up to 2025                                 | From 2030                               |
|                       |                 |                                                                                                                                | Voluntary installation                     | Compulsory to meet net-zero requirement |
| Public gathering      | A1.1            | Venues where people gather for sedentary behaviour                                                                             | 25%                                        | 100%                                    |
|                       | A1.2            | Venues where people gather for non-sedentary behaviour                                                                         | 25%                                        | 100%                                    |
|                       | A2.1            | Theatres and cinemas                                                                                                           | 25%                                        | 100%                                    |
|                       | A2.2            | Sport performance venues                                                                                                       | 25%                                        | 100%                                    |
| Places of instruction | A3.1            | Conference halls, auditoriums, lecture halls, instruction venues, research laboratories, intermediate scale places of learning | 25%                                        | 100%                                    |
| Schools               | A3.3            | Urban, suburban and rural locations                                                                                            | 25%                                        | 100%                                    |
| Places of worship     | A4.1            | Large venues                                                                                                                   | 25%                                        | 100%                                    |
|                       | A4.2            | Small venues                                                                                                                   | 25%                                        | 100%                                    |
| Places of detention   | E1              | Places of detention                                                                                                            | 25%                                        | 100%                                    |
| Hospitals             | E2              | Large hospitals and medium- to short-stay facilities                                                                           | 25%                                        | 50%                                     |
|                       | E2              | Day hospitals and clinics                                                                                                      | 25%                                        | 50%                                     |
|                       | E3              | Institutional (residential)                                                                                                    | 25%                                        | 50%                                     |
|                       | E4              | Healthcare                                                                                                                     | 25%                                        | 50%                                     |
| Retail                | F1              | Large shops (more than 250 m <sup>2</sup> )                                                                                    | 25%                                        | 100%                                    |

|            |    |                                             |     |      |
|------------|----|---------------------------------------------|-----|------|
|            | F2 | Small shops (less than 250 m <sup>2</sup> ) | 25% | 100% |
| Offices    | G1 | Large multistorey office buildings          | 25% | 100% |
|            | G1 | Standalone buildings in office parks        | 25% | 100% |
|            | G1 | Call centres                                | 25% | 100% |
| Residences | H1 | Hotels                                      | 25% | 100% |
|            | H2 | Dormitories                                 | 25% | 100% |
|            | H3 | Domestic residences                         | 0%  | 100% |
|            | H4 | Dwelling houses                             | 0%  | 50%  |
|            | H5 | Hospitality facilities                      | 0%  | 100% |
| Other      |    | Category 1                                  | N/A | N/A  |

The system may be grid-tied, in which case appropriate applications must be made and the plans must be approved by the City of Tshwane Utility Services Department.

Compliance must be demonstrated based on the predicted operational load (x); the percentage that will be provided by RE (y% of x) and the percentage of the grid that is decarbonised at the time (z% of grid) must be accounted for in calculations, showing that z% of (y% of x) needs to be provided by on-site RE. The predicted operational load must be determined by a competent person. As a guide, the predicted load should be 20% more than the baseload (as per Energy 1), although this will vary per unique building use.

### Submission requirements

Before 2030, even if an RE system is not installed, the position of future RE systems must be indicated on the plans, including battery storage space, if applicable. A note must be provided on the plan, specifying that the distribution board will be designed and installed to accommodate future RE. The predicted operational energy load must be indicated on the template and the capacity of the on-site RE system, if applicable, must be indicated and the percentage of the energy demand met by RE must be indicated on the template.

Where renewable energy is to be supplied from a source off-site, this must be stated in the template and the source must be declared. The template must be completed and signed by a competent person.

| Building type        |                                                               |                                     |                         |                             |
|----------------------|---------------------------------------------------------------|-------------------------------------|-------------------------|-----------------------------|
| Type or RE system    | Predicted operational EUI of building (kWh/m <sup>2</sup> /a) | RE system requirement (kWh) per day | RE system capacity (kW) | Percentage demand met by RE |
| Example:<br>Solar PV |                                                               |                                     |                         |                             |
| Off site             |                                                               |                                     |                         |                             |
|                      |                                                               |                                     |                         |                             |
|                      |                                                               |                                     |                         |                             |

Before 2030, the building control officer must check that the position of the future RE system is indicated on the plan as well as battery space, if applicable, and note for the distribution board. The template must be checked for completion, signature by a competent person and correspondence to the plan.

From 2030 onwards and for voluntary installations before 2030, the building control officer must check that the position and capacity of the RE system is indicated on the plan and that the percentage demand met by RE that is stipulated in the template complies with the requirement for the relevant year. The building control officer must check that the template is signed by a competent professional. For the purposes of future monitoring and evaluation, the building control officer must record the erf number and predicted load into a database for follow-up by another once the building has been in operation for at least one year. The site inspector must check that the system is installed as indicated on the plans and is of the size (capacity) stipulated in the table.

### **Energy 3: Energy submetering**

The purpose of this standard is to create awareness of real-time operational energy consumption, to enable the monitoring of operational load and to identify areas of high consumption.

#### **Mandatory standard**

All buildings, except Category H3 and H4 and Category 1 buildings, must have energy submetering in order to monitor and control energy use in the building.

Submetering must measure all substantial (more than or equal to 100 kVA) energy consumption areas. As a minimum, plug circuits and light circuits must be monitored separately and may be further separated into zones. Where HVAC systems and other major building services are installed, these must be monitored separately. Submetering systems must enable data to be captured and presented over time and enable energy profiles to be generated. Data from these meters must be readily accessible to the managers of buildings or facilities and (in future) be available for the City to evaluate for benchmarking purposes.

#### **Submission requirements**

The template must be completed, indicating areas or circuits for submetering, which must also be shown on the plan.

#### **Template example**

|                                    |                      |
|------------------------------------|----------------------|
| <b>Occupancy class:</b>            | G1                   |
| <b>Gross floor area:</b>           | 1 500 m <sup>2</sup> |
| <b>Submetered areas or systems</b> |                      |
| <b>Zone or Circuit 1:</b>          | Floor 1 lights       |
| <b>Zone or Circuit 2:</b>          | Floor 1 plugs        |



|                           |                |
|---------------------------|----------------|
| <b>Zone or Circuit 3:</b> | Floor 2 lights |
| <b>Zone or Circuit 4:</b> | Floor 2 plugs  |
| <b>Zone or Circuit 5:</b> | HVAC system    |

The building control officer must check that the zones or circuits indicated on the plan correspond to those shown in the template and check that the template indicates at least two zones. If substantial uses are present (more than or equal to 100 kVA, HVAC, lifts, etc), the building control officer must check that these are indicated as being separately monitored. The site inspector must verify that the installations on-site are as per the submission documentation.

## **WATER**

### **Water 1: Toilets and urinals**

The purpose of this requirement is to minimise water consumption.

#### **Mandatory standard**

Low-water-use or non-sewered sanitation must be installed. Where flush toilets are installed, they must have a flush volume as per the latest version of SANS 3088: Water Efficiency in Buildings<sup>67</sup>. Where low-flushing systems are installed, the flush rates must not exceed the flush values specified in the latest version of SANS 1733: WC Flushing Systems (Low-flush Capacity) that Operate with Flush Cisterns. Urinal flushes must not exceed the maximum flow rate or volume as per the latest version of SANS 3088<sup>8</sup>.

If non-potable water (for example greywater and/or rainwater) is used to flush toilets, there must be a double reticulation system so that either municipal or alternative water can be used to flush, depending on availability. The reticulation for non-potable water must be completely separated from the potable reticulation system in such a way that back-siphoning of alternative water into the municipal supply is prevented. Non-sewered sanitation must comply with SANS 30500 and International Organization for Standardization (ISO) 31800:2020.

#### **Submission requirements**

A plumbing schedule and corresponding layout alongside the building plan must be provided. A note and/or detail must be provided, indicating that the water reticulation will be installed in such a way as to ensure that back-siphoning of non-potable water into the municipal supply cannot occur. The schedule must be as per the standard template and indicate sanitary fittings, flush or flow rates and water sources and

<sup>6</sup> 2019 version states 3 ℓ or 6 ℓ for half or full flush respectively. This standard shall be replaced by SANS 10400 Part XB, when it is developed.

<sup>7</sup> When SANS 10400 Part XB comes into being it shall replace this reference to SANS 3088.

<sup>8</sup> 2019 version states 2 ℓ per flush

reticulation, where applicable (examples included below), and shown on the plan for reference.

#### Template example

| Sanitary fitting   | Flush rate                         | Water source                                | Alternative reticulation note                                                       | Number of units |
|--------------------|------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------|-----------------|
| Flush toilet       | Dual flush (3 ℓ and 6 ℓ per flush) | Greywater with potable supplementary supply | Greywater reticulation to be completely separate from municipal supply reticulation | 2               |
| Urinal             | Flush rate (1 ℓ per flush)         | Greywater with potable supplementary supply |                                                                                     | 2               |
| Non-sewered toilet | N/A                                | N/A                                         | N/A                                                                                 | 1               |

The building control officer must check that the sanitary schedule is completed and that flush rates are within the stipulated limits and must check that the fixtures in the schedule correspond to the plan. The building control officer must also check that either an alternative water source is indicated for flushing or a note or detail is provided, indicating that future alternative reticulation is accommodated. The site inspector must check that the installation is as per the plan and schedule and that alternative water source details are as per submission documents.

## Water 2: Hand wash basin taps

The purpose of this requirement is to minimise water consumption.

### Mandatory standard

The flow rate in hand wash basin taps must not exceed the maximum flow rate as per the latest version of SANS 3088: Water Usage in Buildings, which according to the 2019 version is as follows:

**Table 3: Flow rate for hand wash basin taps as per SANS 3088, 2019**

| Premises                                                                     | Maximum flow rate                                                                                                                    |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Public areas and public spaces (including offices and commercial activities) | 6 ℓ per minute at 300 kPa; demand-type, self-closing 2 ℓ per cycle at 600 kPa; metered, self-closing 5 ℓ per minute; electronic taps |
| Other                                                                        | 5 ℓ per minute at 600 kPa; single tap 5 ℓ per minute at 600 kPa; mixer screw down 5 ℓ per minute at 100 kPa; mixer single control    |

Hand wash basins provided in building types A1.1, A1.2, A2.1, A2.2, A3.1, A3.3, A4.1, A4.2, E1, A3.3, E1, E3, E4, F1, F2, G1.1, G1.2, G1.3 and H2 must be fitted with demand-type taps or self-closing taps.

## Submission requirements

The location of hand wash basins and the tap specifications (type and flow rate) must be shown on the plans and in the template schedule. The number of taps on the plan and schedule must correspond.

### Template example

|                                       |                  |                 |                        |
|---------------------------------------|------------------|-----------------|------------------------|
| <b>Building category or premises:</b> | G1               |                 |                        |
| <b>Sanitary fitting</b>               | <b>Flow rate</b> | <b>Tap type</b> | <b>Number of units</b> |
| Hand wash basin (demand type)         | 4,5 l per minute | Demand          | 2                      |
|                                       |                  |                 |                        |

The building control officer must check that the details provided in the schedule correspond with the plan, that they are within the stipulated flow rate limit and that they are a suitable type of tap (that is, demand-type where required). The site inspector must check that the position and number of fittings and tap type are as per the submission documentation.

## Water 3: Baths

The purpose of this requirement is to encourage the use of showers rather than baths to reduce the amount of water used for personal washing.

### Mandatory standard

Where baths are installed, a shower fitting must also be provided, whether within the bath or a separate shower within the same room. For ablution facilities with multiple baths and showers, there must be at least one shower per bath or each bath must be fitted with a dedicated shower fitting. The shower fitting flow rate must be as per Water 4.

## Submission requirements

The position of the bath must be indicated on the plan and a note must be provided, indicating that a shower fitting with suitable flow rate will also be installed at the bath. The number of baths and corresponding shower fittings must be indicated on the template.

### Template example

|                         |                                            |                                    |
|-------------------------|--------------------------------------------|------------------------------------|
| <b>Sanitary fitting</b> | <b>Shower fitting included (yes or no)</b> | <b>Number of shower head units</b> |
| Bath                    | Yes                                        | 2                                  |
|                         |                                            |                                    |

The building control officer must check that the details given in the schedule of the template correspond with the plan and that they are within the stipulated flow rate limit.

The site inspector must check that the position and number of fittings are as per the submission documentation and that shower fittings are installed at each bath.

#### Water 4: Showers

The purpose of this requirement is to minimise water consumption.

#### Mandatory standard

The flow rate of shower heads must not exceed the maximum flow rate as per the latest version of SANS 3088: Water Usage in Buildings, which according to the 2019 version is 2 ℓ per cycle for self-closing taps in public spaces and 9 ℓ per minute in other buildings. This standard does not apply to emergency showers. Showers in building types A1.1, A1.2, A2.1, A2.2, A3.1, A3.3, A4.1, A4.2, E1, A3.3, E1, E3, E4, F1, F2, G1.1, G1.2, G1.3 and H2 must be fitted with demand-type taps or self-closing taps.

#### Submission requirements

Showers shall be indicated on the plans, with an annotation for the tap type, and the details shall be recorded on the template.

#### Template example

|                           |                  |                 |                        |
|---------------------------|------------------|-----------------|------------------------|
| <b>Building category:</b> | G1               |                 |                        |
| <b>Sanitary fitting</b>   | <b>Flow rate</b> | <b>Tap type</b> | <b>Number of units</b> |
| Shower                    | 2 ℓ per minute   | Self-closing    | 2                      |
|                           |                  |                 |                        |

The building control officer must check that the type of shower tap is suitable for the type of building (for example self-closing for public showers), that the showers are indicated on the plans and that the details recorded in the template comply with the requirements and correspond to the plans. The site inspector must check that the installations on-site are in accordance with the approved plan and template.

#### Water 5: Hot water pipes

The purpose of this requirement is to minimise water wasted by running cold water out while waiting for hot water to come through.

#### Mandatory standard

A hot water pipe that runs from the point of hot water generation to the delivery device must not exceed the maximum distance allowed as per the latest version of SANS 10252-1: Water Supply and Drainage for Buildings Part 1: Water Supply installations for Buildings, the 2018 version, which specifies the following maximum lengths for dead-leg piping:

**Table 4: Maximum length of dead-leg piping from hot water storage to point of take-off as per SANS 10252-1, 2018**

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| <b>Internal diameter of pipe (mm)</b> | <b>Maximum length of pipe (m)</b> |
|---------------------------------------|-----------------------------------|

|                                           |    |
|-------------------------------------------|----|
| Less than or equal to 15                  | 12 |
| More than 15 and less than or equal to 25 | 8  |
| More than 25                              | 3  |

Hot water pipes must also be insulated as per SANS 10400 Part XA. Exceptions may be made in the case of circulating insulated hot water ring mains where it can be demonstrated that these will use less water and energy than local heating systems.

### Submission requirements

The hot water reticulation must be indicated on the plan and the length of each pipe run must be shown on the reticulation plan. The template must be completed, indicating length of pipe run for each point of use and must correspond to the information shown on the plan.

#### Template example

| Point of use      | Pipe run length (m) from hot water production point |
|-------------------|-----------------------------------------------------|
| Shower tap        | 9 m                                                 |
| Hand wash basin 1 | 8,5 m                                               |
| Hand wash basin 2 | 8 m                                                 |

The building control officer must check that the hot water reticulation is shown on the plan, that the pipe runs indicated on the plan correspond with the template and that both are in accordance with the stipulations of this standard. The site inspector must check that the hot water pipes installed on-site are as per the approved plan and template.

### Water 6: Greywater harvesting

The purpose of this requirement is to minimise potable water consumption by providing an alternative water source.

#### Promoted standard

When this standard is applied, the building or development must have a greywater harvesting system that is the equivalent or larger than the volume of greywater that can be captured from wash hand basins in the building(s). The amount of greywater that can be captured must be calculated as follows per source (for example per hand wash basin) and summed together:

*Flow rate from tap = F (litres per minute)*

*Duration of typical use = t (minutes)*

*Number of uses per day = n*

*Volume collected = ℓ = F × t × n (litres per day)*

The water from the greywater systems must only be used to flush toilets and/or to irrigate non-edible plants. Greywater systems must be designed to comply with the

latest version of SANS 1732: Greywater Reuse Systems: General requirements. Such greywater systems must be designed by a competent person with specific knowledge of the risks associated with greywater use and must only be installed in a building for which a suitable facilities management plan is in place to ensure proper maintenance of the system. Greywater must not to be used for applications where water particles can become aerosolised unless it is specially treated. A legible, permanent and durable sign must be posted at the greywater off-take point(s) stating: “Non-potable water. Do not drink.”

### Submission requirements

A greywater system schematic drawing must be submitted and must be signed by a competent person. The schematic drawings must include specifications, the volume of greywater that can be collected and the volume of the greywater storage tank. The template must be completed to show the amount of greywater collected, storage capacity and the intended use. The position of the greywater storage tank must be indicated on the building plans and a note must be provided, stipulating the signage and the intended use of the greywater. A note must be provided on the plan stating that the greywater system will be maintained in accordance with the instructions of the competent person.

#### Template example

| A                                                  | B                              | C            | D                                                           | E                             |
|----------------------------------------------------|--------------------------------|--------------|-------------------------------------------------------------|-------------------------------|
| Wash-hand basin tap flow rates (litres per minute) | Duration of handwash (minutes) | Uses per day | Greywater collection potential (litres per day) (A × B × C) | Greywater storage tank volume |
| 6                                                  | 0,5                            | 8            | 24 ℓ                                                        | 500 ℓ                         |

The building control officer must check that the submission requirements are provided, that they comply and that the volume of the storage tank (Column E) is greater than or equal to the daily collection potential (Column D). The building control officer must check that the stated use of the greywater is in accordance with this standard and that there is a statement requiring the maintenance of the system. The site inspector must check that the installation on-site is in accordance with the submission documentation.

### Water 7: Swimming and ornamental pools

The purpose of this requirement is to minimise potable water consumption by reducing the volume of municipal potable water used on a site.

#### Promoted standard

Water to top-up swimming pools and ornamental ponds with a volume of 2 m<sup>3</sup> or more must be sourced from harvested rainwater. Rainwater must be collected from roofs and hardscape surfaces on the site for the purpose of topping up pools. This must be in addition to rainwater collected and used for flushing toilets, irrigation or other uses as per Adaptation 2.

The required volume of rainwater to be collected per annum must be equal to the volume of the pool up to 0,1 m depth. For example, if the surface area of a pool is 5 m<sup>2</sup>, the volume required would be 5,0 × 1,0 = 5,0 m<sup>3</sup> or 500 ℓ. This is the minimum required capacity of the rainwater harvesting system. This requirement does not apply where the pool is indoors or permanently covered.

### Submission requirements

For building developments requiring an SDP, this standard must be demonstrated on the SDP and on the building plan. The pool must be indicated on the building plan and the surface area and volume of the pool must be indicated on the plan and template. If the pool is an indoor pool or permanently covered, this must be stated on the plan. The position of the rainwater storage tank must be indicated on the plan and the volume must be indicated on the plan and on the template.

#### Template example

| A                                     | B                                           | C                                                                           | D                                                        |
|---------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Volume of pool (m<sup>3</sup>)</b> | <b>Surface area of pool (m<sup>2</sup>)</b> | <b>Minimum rainwater harvesting capacity required (B × 0,1 × 1 000) (ℓ)</b> | <b>Actual rainwater harvesting capacity provided (ℓ)</b> |
| 50 m <sup>3</sup>                     | 38 m <sup>2</sup>                           | 3 800 ℓ                                                                     | 5 000 ℓ                                                  |

The building control professional must evaluate the SDP and the building control officer must evaluate the building plans to check that the pool is not an indoor pool, in which case this standard does not apply. The building control professional and building control officer must check that the pool is indicated on the plans and that the volume and surface area of the pool are indicated on the plan and on the template. They must check that the calculated volume required (Column C) is correct and the volume of the storage tank provided (Column D) is at least the same as the volume of water required (Column C). The site inspector must check that the rainwater storage tank is installed on-site as per the plan, that it is of the correct capacity and that the pool cover is installed as stipulated on the approved plans.

### Water 8: Irrigation

The purpose of this requirement is to minimise potable water consumption by substituting water for irrigation with alternative sources.

#### Mandatory standard

This standard is only applicable where an LDP prepared by a professional landscape designer is a requirement in terms of the Tshwane Town-planning Scheme.

All water used to irrigate landscapes and planting must be sourced from rainwater harvesting or greywater harvesting. The rainwater or greywater capacity required for irrigation must be calculated in addition to the capacity required for rainwater harvesting (Adaptation 2), rainwater for filling swimming pools (Water 7) and greywater for flushing toilets (Water 1), if applicable. Municipal potable water supplies must only be used for establishing the landscape and for irrigating edible crops. The

minimum rainwater or greywater harvesting capacity required must be calculated by multiplying the surface area of the landscape requiring irrigation by the irrigation requirements in millimetres per week, multiplied by 16 to get the minimum rainwater harvesting capacity volume, as per the following calculation:

$$\begin{aligned} \text{Landscaped area (m}^2\text{)} &= A \\ \text{Irrigation requirements (mm/week)} &= \ell r \\ \text{Factor} &= 16 \\ \text{Water harvesting requirement (kilolitre)} &= \ell = A \times \ell r \times 16 \end{aligned}$$

For example, if the landscaped area is 50 m<sup>2</sup> and the irrigation requirements are 20 mm per week, irrigation water requirements per week would be 50,0 × 0,02 × 16 = 16,0 kℓ or 16 000 ℓ. This is the minimum required capacity of the water harvesting system.

Note: Edible crops are not to be irrigated with greywater. Irrigation requirements for landscaping must be limited by applying the principles of the Guide to Water Wise Landscaping (South African Landscapers' Institute and Rand Water, 2017).

### Submission requirements

For building developments that require an LDP and an SDP, this standard must be demonstrated on the LDP and SDP as well as on the building plan. The area to be irrigated must be indicated on the LDP and the position of the water storage tank(s) and irrigation reticulation must be indicated on the SDP. The volume of storage required must be calculated and indicated on the template. There must be a note on the plan indicating that edible plants must not be irrigated with greywater.

#### Template example

| A                                       | B                      | C                                     | D                                     | E      | F                                                | G                                       |
|-----------------------------------------|------------------------|---------------------------------------|---------------------------------------|--------|--------------------------------------------------|-----------------------------------------|
| Type of vegetation requiring irrigation | Area (m <sup>2</sup> ) | Irrigation requirements (mm per week) | Weekly water requirements (ℓ) (B × C) | Factor | Minimum harvesting capacity required (ℓ) (D × E) | Actual harvesting capacity provided (ℓ) |
| Front lawn                              | 50                     | 20                                    | 1 000                                 | 16     | 16 000                                           | 20 000                                  |

The building control professional must check that the area to be irrigated is indicated on the SDP and that it corresponds with the data in the template. The building control professional must also check that the volume of storage provided (Column G) is at least equal to the required volume (Column F) and that the position and volume of storage tank(s) are indicated on the plan. The building control professional must check that there is a note stipulating that edible plants must not be irrigated with greywater and that the LDP and SDP have been approved by the Environment and Agriculture Management Department, which will check that the planting plan is in accordance with the Guide to Water Wise Landscaping.

The building control officer must evaluate the building plan to confirm that adherence to the LDP and SDP has been accepted by the City's Environment and Agriculture



Management Department. The site inspector must check that the installations on-site are according to the approved LDP.

### **Water 9: Water submetering**

The purpose of this requirement is to reduce potable water consumption through real-time monitoring and awareness.

#### **Promoted standard**

All buildings larger than 1 000 m<sup>2</sup> must have water submeters to monitor and manage water consumption on the site and in the building. These meters must be installed to separately measure all major water uses (zone or water use point), including irrigation, bathrooms, kitchens, washdown areas, HVAC systems and recycled water supply. Meters must be capable of being monitored easily manually or electronically. If the water consumption of one of the large water uses can be calculated by simply subtracting the other metered data from the total consumption, such an area does not need a separate meter.

#### **Submission requirements**

The template must be completed, indicating areas or water points to be connected to the submeter, which must also be indicated on the plan.

#### **Template example**

|                                            |                               |
|--------------------------------------------|-------------------------------|
| <b>Gross floor area:</b>                   | 1 000 m <sup>2</sup>          |
| <b>Submetered zone or water use points</b> |                               |
| <b>Zone or Point 1:</b>                    | Floor 1 kitchen and bathrooms |
| <b>Zone or Point 2:</b>                    | Floor 2 bathrooms             |
| <b>Zone or Point 3:</b>                    | External and irrigation       |
| <b>Zone or Point 4:</b>                    | Plant room                    |

The building control officer must check that the zones or water use points indicated on the building plan correspond to those shown in the template and check that the template indicates that at least one zone is on a submeter. The site inspector must verify that the installations on-site are as per the submission documentation.

### **Water 10: Separate reticulation**

The purpose of this standard is to facilitate the retrofitting of alternative water sources without requiring costly and disruptive replumbing.

#### **Promoted standard**

Water reticulation and wastewater systems must be designed to accommodate the use of greywater and/or rainwater to flush toilets, even if such a system is not installed.

#### **Submission requirements**

If a non-potable water source for flushing (such as rainwater or greywater) is not installed, a note and/or detail must be provided on the plan, stipulating that the water reticulation will be installed in such a way as to accommodate future installation of an alternative water source that has separate reticulation and this must be indicated on the template.

**Template example**

|                                                |     |
|------------------------------------------------|-----|
| <b>Water 10: Separate reticulation</b>         |     |
| <b>Note and/or detail provided on the plan</b> | Yes |

**WASTE**

**Waste 1: Solid waste**

The purpose of this standard is to divert operational waste generated by building users from landfill sites by encouraging separation at source for recycling.

**Mandatory standard**

Recycling storage areas must be provided for all buildings with a gross floor area of more than 500 m<sup>2</sup> or for sites where the total cumulative gross floor area is more than 500 m<sup>2</sup> (such as townhouse developments). Recycling storage areas must be covered with a roof, well-ventilated, protected from vermin and located where there is easy vehicle access for collection (such as near a street access). Building classification H4 is exempt from this this standard.

Where there are a number of units on one site, such as a townhouse development, a single recycling area may be provided, provided that this has adequate capacity (that means that the total recycling storage area should not be less than what would be required for individual units). The area for recycling storage must meet the requirements listed in Table 5.

**Table 5: Requirements for recycling storage area**

| <b>Gross floor area of building(s) (m<sup>2</sup>)</b> | <b>Minimum area of recycling storage required per gross floor area (m<sup>2</sup>)</b> |
|--------------------------------------------------------|----------------------------------------------------------------------------------------|
| 501 to 1 000                                           | 0,005                                                                                  |
| 1 001 to 5 000                                         | 0,0035                                                                                 |
| More than 5 001                                        | 0,0025                                                                                 |

**Submission requirements**

The location and details (such as vermin-proofing and roofing) must be indicated on the SDP (if required) and the building plan. The gross floor area of the building(s) must be indicated in the template and the minimum recycling storage area required must be calculated and indicated on the template.

#### Template example

| A                                                                                | B                                                                                           | C                                                                 | D                                                        |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------|
| Gross floor area or cumulative gross floor area of building(s) (m <sup>2</sup> ) | Minimum area of recycling storage required per gross floor area (m <sup>2</sup> ) (Table 5) | Minimum recycling storage area required (m <sup>2</sup> ) (A × B) | Actual recycling storage area provided (m <sup>2</sup> ) |
| 2 000                                                                            | 0,0035                                                                                      | 7                                                                 | 15                                                       |

The building control professional must evaluate the SDP and the building control officer must evaluate the building plan to check that the required capacity (Column C) is met by the actual capacity (Column D) provided. They must also check that the drawings indicate a roof cover, ventilation openings and vermin-proofing and that the recycling storage area is indicated on the plan and is located suitably for ease of collection. The site inspector must check that the installation on-site is as per the submission documentation.

#### Waste 2: Construction waste

The intention of this standard is to divert construction waste from landfill sites and to encourage recycling or reuse.

#### Mandatory standard

There must be a Waste Management Plan in place before construction starts, indicating a commitment to divert at least 30% (by mass) of construction waste from landfill sites by recycling or reusing materials. The Waste Management Plan must indicate that diverted waste will be recycled or reused, including the destination of such diverted material. Such a Waste Management Plan must be submitted to the site inspector and a waybill must be provided.

#### Submission requirements

There must be a note on the plan stipulating the requirement for the contractor to have a Waste Management Plan in place, indicating that at least 30% (by mass) of the construction waste will be diverted from landfill sites and recycled or reused.

The building control officer must check that the required note regarding the Waste Management Plan is provided on the building plans. The site inspector must receive a copy of the Waste Management Plan and a waste report with supporting waybills, indicating all waste generated on-site and indicating the percentage of waste by mass diverted from landfill sites for recycling before issuance of an occupation certificate. Non-compliance at site inspection cannot be rectified and, thus, non-compliance will result in a fine.

#### Waste 3: Demolition waste

The purpose of this standard is to divert waste from landfill sites and to encourage recycling or reuse of materials.

### **Mandatory standard (if applicable)**

At least 50% (by mass) of demolition waste must be reused or recycled. There must be a Waste Management Plan in place before work commences on the site, confirming a commitment to divert at least 50% (by mass) of demolition waste from landfill sites by recycling or reusing materials, and the destination of such diverted material. This must be stipulated on the demolition plans. Such a Waste Management Plan must be submitted to the site inspector and a waybill must be provided.

### **Submission requirements**

There must be a note on the demolition plan stipulating the requirement for the contractor to have a Waste Management Plan in place, indicating that at least 50% (by mass) of the demolition waste will be diverted from landfill sites and recycled or reused.

The building control officer must check that the required note regarding the Waste Management Plan is provided on the demolition plan. The site inspector must receive a copy of the Waste Management Plan and a waste report with supporting waybills indicating all waste generated on-site, indicating the percentage of waste by mass diverted from landfill for recycling. Non-compliance cannot be rectified at site inspection and, thus, non-compliance will result in a fine.

## **TRANSPORT**

### **Transport 1: Non-motorised transport provision**

The purpose of this requirement is to facilitate and support the transition to non-motorised transport.

### **Mandatory standard**

Provision must be made to facilitate the use of non-motorised transport for all occupancy building types except for D4, H4, H3, J1, J2 and J3.

Secure, weather-protected bicycle storage should be provided at a rate of three per 100 occupants. Change rooms with lockers and showers must be provided at a rate of one shower per five bicycle parking bays and one locker per bicycle parking bay. Change rooms must be close to the bicycle storage. Bicycle parking bays must not be less than 1 000 mm wide and 1 800 mm long.

### **Submission requirements**

The location of car parking, bicycle storage and showers and lockers must be shown on the SDP, where required, and on the building plans. The number of occupants and the relative number of bicycle parking bays, showers and lockers required and provided must be indicated on the template.

### Template example

| A                                           | B                                                                                                               | C                               | D                                                      | E                          | F                                                | G                          |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------|----------------------------|--------------------------------------------------|----------------------------|
| Number of occupants (see SANS 10400 Part A) | Number of bicycle bays required (three per 100 occupants) (A / 100 x 3, rounded up to the nearest whole number) | Number of bicycle bays provided | Number of showers required (one per five bicycle bays) | Number of showers provided | Number of lockers required (one per bicycle bay) | Number of lockers provided |
| 120                                         | 3,6; therefore 4                                                                                                | 4                               | 1                                                      | 2                          | 4                                                | 4                          |

The building control professional must evaluate the SDP and the building control officer must evaluate the building plan to check that the requirements for bicycle parking bays, showers and lockers are met or exceed the actual provided. The site inspector must check that the provision of facilities on-site is as stipulated on the submission documentation.

### Transport 2: Non-motorised transport routes

The purpose of this requirement is to facilitate the transition of non-motorised transport.

#### Mandatory standard

For developments that include internal roads (such as office parks), cycle routes and pedestrian paths should be included and clearly designated, and provision must be made for safe passage at road crossings and junctions. A safe passage is any designated portion of the road to allow road users (pedestrians and cyclists) a safe passing by controlled junctions (for example by traffic signals, a stop or yield sign or pedestrian crossing marks). It is free of safety hazards, slippery walkways and protruding obstacles limiting the user's vision. Ramps to facilitate access over kerbs for cyclists or users of other light vehicles, such as light scooters, must be provided where required. Pedestrians and cyclists must be separated from vehicular traffic. This must be clearly designated.

#### Submission requirements

For building developments requiring an SDP, this standard must be demonstrated on the SDP and on the building plan. Cycle and pedestrian routes must be indicated on the plan as well as signage, barriers or other traffic calming measures to ensure safety of users.

The building control professional must evaluate the SDP and the building control officer must evaluate the building plan to check that cycle routes and pedestrian paths are indicated on the plan, that they are clearly designated and separated from

vehicular traffic on the site and are approved by the Roads and Transport Department. The site inspector must check that the facilities on-site are as per the SDP.

### **Transport 3: Electric vehicle charging points**

The purpose of this requirement is to facilitate the transition of non-motorised transport.

#### **Mandatory standard**

Electric vehicle (EV) charging bays must be provided at a rate of one charging station for every 50 parking bays. These must be provided in preferred parking spaces.

#### **Submission requirements**

The location and number of EV charging bays must be indicated on the plans. The number of car parking bays and number of EV charging bays required and provided must be indicated on the template.

#### **Template example**

| <b>A</b>                                                           | <b>B</b>                                                             | <b>C</b>                          |
|--------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------|
| <b>Number of parking bays required by the Town-planning Scheme</b> | <b>Number of EV bays required (one per 50 parking bays) (A / 50)</b> | <b>Number of EV bays provided</b> |
| 60                                                                 | $1,2 = 2$                                                            | 3                                 |
|                                                                    |                                                                      |                                   |

The building control professional must check that the provided number of EV charging bays (Column C) is the same or more than the required number (Column B), that the location is shown on the plan and that the location is in a preferred parking area (close to entrance of building). The site inspector must check that the facilities provided on-site are as per the approved documentation.

## SCHEDULE I TEMPLATE

The following template must be completed and submitted with plan applications. The shaded cells are for building control use only.

| <b>Adaptation 1: Urban heat island</b>                                                            |                                                   |                                    |                                                                              |                                      |                                                               |                                            | <b>Complies on plan (yes or no)</b>                                    | <b>Complies on site (yes or no)</b>        |                                |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------|--------------------------------------------|--------------------------------|
| <b>SDP applicable and plan in accordance with the approved SDP (yes or no):</b>                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
| <b>Vegetative rooftop garden structure signed off on by a competent professional (yes or no):</b> |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
| A                                                                                                 | B                                                 | C                                  | D                                                                            | E                                    |                                                               |                                            |                                                                        |                                            |                                |
| Surface description and material                                                                  | Total area (m <sup>2</sup> ) of hardscape or roof | Hardscape area that is treated     | Percentage treated area<br>(C / B) × 100 = %                                 | Treatment                            |                                                               |                                            |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              | Aged SRI                             | Vegetative roof                                               | Shading                                    |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
| <b>Adaptation 2: Rainwater harvesting</b>                                                         |                                                   |                                    |                                                                              |                                      |                                                               |                                            | <b>Complies on plan (H more than F, and J more than F) (yes or no)</b> | <b>Complies on site (yes or no)</b>        |                                |
| <b>SDP applicable and plan in accordance with the approved SDP (yes or no):</b>                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
| A                                                                                                 | B                                                 | C                                  | D                                                                            | E                                    | F                                                             | G                                          | H                                                                      | I                                          | J                              |
| Number of occupants                                                                               | Occupancy rate (0 to 1.0)                         | FTE (A × B)                        | Water consumption per FTE day (litres)                                       | Days of stored water required (days) | Required volume of stored water required (litres) (C × D × E) | Rainwater catchment area (m <sup>2</sup> ) | Rainwater catchment capacity (litres)                                  | Storage capacity in litres per FTE (H / C) | Tank capacity provided on plan |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
| <b>Adaptation 3: Drinking water</b>                                                               |                                                   |                                    |                                                                              |                                      |                                                               |                                            | <b>Complies on plan (E more than or equal to D) (yes or no)</b>        | <b>Complies on site (yes or no)</b>        |                                |
| A                                                                                                 | B                                                 | C                                  | D                                                                            | E                                    |                                                               |                                            |                                                                        |                                            |                                |
| Building type                                                                                     | Number of occupants                               | Number of occupants divided by 100 | Number of drinking taps<br>(Column C rounded up to the nearest whole number) | Number of drinking taps provided     |                                                               |                                            |                                                                        |                                            |                                |
|                                                                                                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |
| <b>Adaptation 4: Storm water management</b>                                                       |                                                   |                                    |                                                                              |                                      |                                                               |                                            | <b>Complies on plan (yes or no)</b>                                    | <b>Complies on site (yes or no)</b>        |                                |
| <b>SDP applicable and plan in accordance with the approved SDP (yes or no):</b>                   |                                                   |                                    |                                                                              |                                      |                                                               |                                            |                                                                        |                                            |                                |

|                                                     |  |  |
|-----------------------------------------------------|--|--|
| Plan and report by a competent person submitted     |  |  |
| Plan approved by the Roads and Transport Department |  |  |

|                                                                                              |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------|------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------|
| <b>Energy 1: Energy use intensity</b>                                                        |                                                                                                                                                                      |                                                           |                                 |                                    | <b>Complies on plan (total kWh/m<sup>2</sup>/a less than or equal to target) (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Building or occupancy type:</b>                                                           |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Target EUI (kWh/m<sup>2</sup>/a or percentage improvement or lighting power density):</b> |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| 1                                                                                            | <b>Service</b>                                                                                                                                                       | <b>EUI (kWh/m<sup>2</sup>/a)</b>                          |                                 |                                    |                                                                                              |                                     |
|                                                                                              | Lifts                                                                                                                                                                | (eg 3 800 kWh/a)                                          |                                 |                                    |                                                                                              |                                     |
|                                                                                              | Escalators                                                                                                                                                           |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | HVAC system                                                                                                                                                          |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | Water heating                                                                                                                                                        |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | Lighting                                                                                                                                                             | <i>(sum of watts for lighting in kW x hours per year)</i> |                                 |                                    |                                                                                              |                                     |
|                                                                                              | Other                                                                                                                                                                |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | <b>Total kWh/a:</b>                                                                                                                                                  |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | <b>Usable floor area (m<sup>2</sup>):</b>                                                                                                                            |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Total kWh/m<sup>2</sup>/a:</b>                                                            | <i>(total kWh/a / usable area)</i>                                                                                                                                   |                                                           |                                 |                                    |                                                                                              |                                     |
| 2                                                                                            | <b>Percentage improvement in energy efficiency:</b><br>(must be indicated if software is used instead of the above calculation and software report must be provided) |                                                           |                                 |                                    |                                                                                              |                                     |
| 3                                                                                            | Lighting power density:                                                                                                                                              |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | Solar water heating system included (yes or no):                                                                                                                     |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              | SANS 10400 Part XA deemed-to-satisfy requirements met (yes or no):                                                                                                   |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Energy 2: Renewable energy</b>                                                            |                                                                                                                                                                      |                                                           |                                 |                                    | <b>Complies on plan (yes or no)</b>                                                          | <b>Complies on site (yes or no)</b> |
| <b>Type or RE system and on or off site</b>                                                  | <b>Predicted operational EUI of building (kWh/m<sup>2</sup>/a)</b>                                                                                                   | <b>RE system requirement (kWh)</b>                        | <b>RE system capacity (kWh)</b> | <b>Percentage demand met by RE</b> |                                                                                              |                                     |
|                                                                                              |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
|                                                                                              |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Energy 3: Submetering</b>                                                                 |                                                                                                                                                                      |                                                           |                                 |                                    | <b>Complies on plan (yes or no)</b>                                                          | <b>Complies on site (yes or no)</b> |
| <b>Occupancy class:</b>                                                                      |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Gross floor area:</b>                                                                     |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Submetered areas or systems</b>                                                           |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Zone or Circuit 1:</b>                                                                    |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Zone or Circuit 2:</b>                                                                    |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Zone or Circuit 3:</b>                                                                    |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |
| <b>Zone or Circuit 4:</b>                                                                    |                                                                                                                                                                      |                                                           |                                 |                                    |                                                                                              |                                     |



|                           |  |  |  |
|---------------------------|--|--|--|
| <b>Zone or Circuit 5:</b> |  |  |  |
|---------------------------|--|--|--|

| <b>Water 1: Toilets and urinals</b>                          |                                                            |                     |                                                               |                                      | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
|--------------------------------------------------------------|------------------------------------------------------------|---------------------|---------------------------------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|
| <b>Sanitary fitting</b>                                      | <b>Flush rate</b>                                          | <b>Water source</b> | <b>Alternative reticulation note</b>                          | <b>Number of units</b>               |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Water 2: Hand wash basins</b>                             |                                                            |                     |                                                               |                                      | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Building category:</b>                                    |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Sanitary fitting</b>                                      | <b>Flow rate</b>                                           | <b>Tap type</b>     | <b>Number of units</b>                                        |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Water 3: Baths</b>                                        |                                                            |                     |                                                               |                                      | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Sanitary fitting</b>                                      | <b>Shower fitting included per bath (yes or no)</b>        |                     | <b>Number of units</b>                                        |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Water 4: Showers</b>                                      |                                                            |                     |                                                               |                                      | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Building category:</b>                                    |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Sanitary fitting</b>                                      | <b>Flow rate</b>                                           | <b>Tap type</b>     | <b>Number of units</b>                                        |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Water 5: Hot water pipes</b>                              |                                                            |                     |                                                               |                                      | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Point of use</b>                                          | <b>Pipe run length (m) from hot water production point</b> |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
| <b>Water 6: Greywater harvesting</b>                         |                                                            |                     |                                                               |                                      | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>A</b>                                                     | <b>B</b>                                                   | <b>C</b>            | <b>D</b>                                                      | <b>E</b>                             |                                     |                                     |
| <b>Wash hand basin tap flow rates (ℓ per minute)</b>         | <b>Duration of handwash (minutes)</b>                      | <b>Uses per day</b> | <b>Greywater collection potential (ℓ per day) (A × B × C)</b> | <b>Greywater storage tank volume</b> |                                     |                                     |
|                                                              |                                                            |                     |                                                               |                                      |                                     |                                     |
| Schematic drawing provided and signed by a competent person: |                                                            |                     |                                                               |                                      |                                     |                                     |
| Position of greywater storage tank shown on the plan:        |                                                            |                     |                                                               |                                      |                                     |                                     |
| Use of greywater indicated in a note on the plan:            |                                                            |                     |                                                               |                                      |                                     |                                     |
| Signage note provided on the plan:                           |                                                            |                     |                                                               |                                      |                                     |                                     |

|                                                                                                  |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
|--------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------|---------------|----------------------------------------------------------|------------------------------------------------|-------------------------------------|-------------------------------------|
| <b>Water 7: Pools</b>                                                                            |                                             |                                                                             |                                            |               |                                                          |                                                | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>SDP applicable and plan in accordance with the approved SDP (yes or no):</b>                  |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>A</b>                                                                                         | <b>B</b>                                    | <b>C</b>                                                                    |                                            |               | <b>D</b>                                                 |                                                |                                     |                                     |
| <b>Volume of pool (m<sup>3</sup>)</b>                                                            | <b>Surface area of pool (m<sup>2</sup>)</b> | <b>Minimum rainwater harvesting capacity required (B × 0,1 × 1 000) (ℓ)</b> |                                            |               | <b>Actual rainwater harvesting capacity provided (ℓ)</b> |                                                |                                     |                                     |
|                                                                                                  |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Water 8: Irrigation</b>                                                                       |                                             |                                                                             |                                            |               |                                                          |                                                | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>SDP or LDP applicable and plan in accordance with the approved SDP (yes or no):</b>           |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>SDP or LDP approved by the Environment and Agriculture Management Department (yes or no):</b> |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>A</b>                                                                                         | <b>B</b>                                    | <b>C</b>                                                                    | <b>D</b>                                   | <b>E</b>      | <b>F</b>                                                 | <b>G</b>                                       |                                     |                                     |
| <b>Type of vegetation requiring irrigation</b>                                                   | <b>Area (m<sup>2</sup>)</b>                 | <b>Irrigation requirements (mm / week)</b>                                  | <b>Weekly water requirements (ℓ) (B*C)</b> | <b>Factor</b> | <b>Minimum harvesting capacity required (ℓ) (D*E)</b>    | <b>Actual harvesting capacity provided (ℓ)</b> |                                     |                                     |
|                                                                                                  |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Water 9: Water submetering</b>                                                                |                                             |                                                                             |                                            |               |                                                          |                                                | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Gross floor area:</b>                                                                         |                                             | 1 000 m <sup>2</sup>                                                        |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Submetered zone or water use points</b>                                                       |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Zone or Point 1:</b>                                                                          |                                             | Floor 1 kitchen and bathrooms                                               |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Zone or Point 2:</b>                                                                          |                                             | Floor 2 bathrooms                                                           |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Zone or Point 3:</b>                                                                          |                                             | External and irrigation                                                     |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Zone or Point 4:</b>                                                                          |                                             | Plant room                                                                  |                                            |               |                                                          |                                                |                                     |                                     |
|                                                                                                  |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
| <b>Water 10: Separate reticulation</b>                                                           |                                             |                                                                             |                                            |               |                                                          |                                                | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>Note provided on the plan</b>                                                                 |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |
|                                                                                                  |                                             |                                                                             |                                            |               |                                                          |                                                |                                     |                                     |

|                                                        |                                                                                                  |                                                                        |                                                               |                                     |                                     |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------|-------------------------------------|
| <b>Waste 1: Solid waste recycling</b>                  |                                                                                                  |                                                                        |                                                               | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>A</b>                                               | <b>B</b>                                                                                         | <b>C</b>                                                               | <b>D</b>                                                      |                                     |                                     |
| <b>Gross floor area of building(s) (m<sup>2</sup>)</b> | <b>Minimum area of recycling storage required per gross floor area (m<sup>2</sup>) (Table 5)</b> | <b>Minimum recycling storage area required (m<sup>2</sup>) (A × B)</b> | <b>Actual recycling storage area provided (m<sup>2</sup>)</b> |                                     |                                     |
|                                                        |                                                                                                  |                                                                        |                                                               |                                     |                                     |
| <b>Waste 2: Construction waste</b>                     |                                                                                                  |                                                                        |                                                               | <b>Complies on plan</b>             | <b>Complies on site</b>             |

|                                                                           |                                     |                                     |
|---------------------------------------------------------------------------|-------------------------------------|-------------------------------------|
|                                                                           | (yes or no)                         | (yes or no)                         |
| Note regarding Waste Management Plan provided on the plan (yes or no):    |                                     |                                     |
| Waste Management Plan and suitable evidence provided on site (yes or no): |                                     |                                     |
| <b>Waste 3: Demolition waste</b>                                          | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| Note regarding Waste Management Plan provided on the plan (yes or no):    |                                     |                                     |
| Waste Management Plan and suitable evidence provided on site (yes or no): |                                     |                                     |

| <b>Transport 1: Non-motorised transport</b>                                               |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| <b>A</b>                                                                                  | <b>B</b>                                                                         | <b>C</b>                                                             | <b>D</b>                                                  | <b>E</b>                          | <b>F</b>                                                | <b>G</b>                          |                                     |                                     |
| <b>Number of occupants (see SANS 10400 Part A)</b>                                        | <b>Number of bicycle bays required (round up to whole number: (A / 100 x 3))</b> | <b>Number of bicycle bays provided</b>                               | <b>Number of showers required (one per five bicycles)</b> | <b>Number of showers provided</b> | <b>Number of lockers required (one per bicycle bay)</b> | <b>Number of lockers provided</b> |                                     |                                     |
|                                                                                           |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
| <b>Transport 2: Non-motorised transport routes</b>                                        |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   | <b>Complies on plan (yes or no)</b> | <b>Complies on site (yes or no)</b> |
| <b>SDP applicable and plan in accordance with the approved SDP (yes or no):</b>           |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
| Cyclist and pedestrian routes are indicated on the site plan (yes or no):                 |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
| Cyclist and pedestrian routes are constructed according to the approved plan (yes or no): |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
| Plans approved by the Roads and Transport Department (yes or no):                         |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
| <b>Transport 3: Electric vehicle charging bays</b>                                        |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
| <b>A</b>                                                                                  |                                                                                  | <b>B</b>                                                             |                                                           |                                   | <b>C</b>                                                |                                   |                                     |                                     |
| <b>Number of parking bays required by the Town-planning Scheme</b>                        |                                                                                  | <b>Number of EV bays required (one per 50 parking bays) (A / 50)</b> |                                                           |                                   | <b>Number of EV bays provided</b>                       |                                   |                                     |                                     |
|                                                                                           |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |
|                                                                                           |                                                                                  |                                                                      |                                                           |                                   |                                                         |                                   |                                     |                                     |