CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

GUIDELINES FOR THE INSTALLATION OF ALTERNATIVE WATER SYSTEMS

Making progress possible. Together.

EXECUTIVE SUMMARY

The City of Cape Town promotes the responsible use of alternative water sources to help minimise the quantity of water drawn from our dams, especially in times of drought. Alternative water also forms part of the City's water resilience drive, recognising that unreliable rainfall will be the 'new normal' going forward.

These guidelines have been developed to show how to safely install and use alternative water systems, where they are to be plumbed into buildings, and connected with a water installation. This needs to be well managed and regulated as alternative water systems pose potentially serious health and environmental risks, including contamination of the drinking water supply. Although this document does not have official legal status, it does point to the relevant legislation and regulations, as well as best practices.

For the purpose of this document, 'alternative water systems' include greywater, rainwater, groundwater (from boreholes, wellpoints or springs), basement water, surface water (taken directly from streams/rivers) and treated effluent/ wastewater. For a definition of each of these, consult section 3. These first-edition guidelines do not go into the details of water produced through desalination, atmospheric water-generating systems ('water from air') and on-site wastewater treatment (blackwater reclamation 'package plants'). Intended for smaller-scale systems in homes and businesses, the guidelines also do not fully address the more complex systems of larger users such as commercial and industrial businesses. While the same principles would apply to larger systems, specialist expertise should be sought.

The key principles for the protection of municipal water supply as well as human, environmental and infrastructural health are as follows:

- **Potentially dangerous alternative water must be prevented from contaminating the drinking water system** on the premises and in the surrounding area(s). **In this regard, it is mandatory to install a Reduced Pressure Zone (RPZ) valve back-flow preventer,** as shown in the illustrations contained in these guidelines, and as per the City's Water By-law. Non-return valves and standard stopcock valves are not approved back-flow prevention devices for harmful or toxic substances. Back-flow prevention by means of an air gap tank is the only acceptable alternative to an RPZ back-flow preventer at present. All back-flow prevention installations need to be inspected and approved by the City. For more on this, turn to section 5.

- **The quality of an alternative water source, and how it is stored and managed, is the key consideration in determining where and how it can be used.** Water quality standards, guidelines and regulations are set across all spheres of government, including in the City's Water By-law, to protect people from potentially serious health risks and safeguard our environment. In section 4.1 of these guidelines, the appropriate uses for each alternative water source are outlined. These should be read in conjunction with the risk and water quality matrix provided in section 4.2. Alternative water sources should first be tested at a laboratory recognised by the South African National Accreditation System, and the results compared with the recommended quality indicated for use in the summary table of national water quality guidelines. Different levels of treatment may be needed before the water can be used for certain purposes.

- **Discharge of used alternative water or any effluent generated must be directed to the correct place.** Details in this regard are contained in section 6.5 of these guidelines. Discharge containing harmful chemicals or substances should be directed to the sewer system for treatment/neutralisation at the City's wastewater treatment works, provided that the discharge is within the prescribed limits stipulated in the City's Wastewater and Industrial Effluent By-law. Overflows from tanks containing untreated rainwater should be directed to the stormwater drainage. Rainwater that has been treated with chemicals (e.g. chlorine) should be directed to the sewer. Storage tanks for other forms of alternative water should also overflow to the sewer.

All alternative water systems plumbed into a building (connected to a water installation) and used are subject to approval from the City. However, the abstraction and storage of groundwater and, surface water is also subject to authorisation and registration by the national Department of Water and Sanitation (DWS).

According to national legislation and the City's Water By-law, no alternative water may be used for drinking, cooking (including food preparation) or body washing (ablution). Exceptions are made for large residential developments, businesses and related entities that enter into a contract with the City to operate as a Water Services Intermediary. Such intermediaries agree to provide drinking quality water to those visiting, living or working at their premises. This water needs to adhere to strict treatment conditions and be closely monitored. As the City has a statutory responsibility for water quality in uses that involve close human contact and ingestion, as well as for the associated potential health risks, it has to be very cautious where drinking water is provided by another entity, or where people want to supply themselves.

The use of alternative water occurs entirely at consumers' own risk. As stated in the Water By-law, the City is not liable for any consequential damage or loss arising directly or indirectly from such water use.

These guidelines are consistent with the requirements of current legislation and regulations, including the National Water Act, national standards, national water quality guidelines and the City's Water By-law (amended in 2018). The guidelines will be updated as related policy or legislation changes or if a material/substantial need for updates arises. Consult the City's website for all future updates.

DISCLAIMER: Although this document does not have official legal status, it does point to the relevant legislation and regulations, as well as best practices. Adherence to the guidelines does not exempt consumers from the obligation to comply with legislation and regulations. Furthermore, these guidelines are issued for information purposes only, and they do not constitute a contractual commitment on the part of the City.

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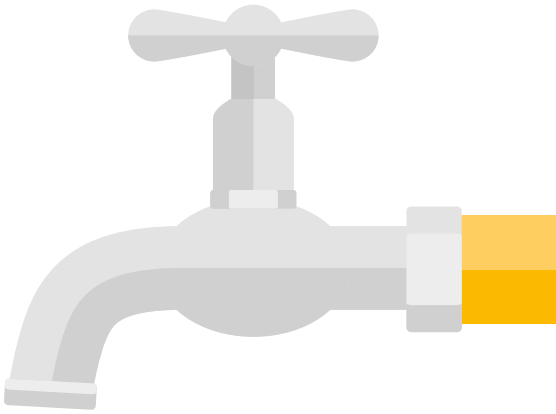
1. INTRODUCTION

Cape Town has experienced a multiyear drought, and residents had to cut down on their use of municipal drinking water at home, work and elsewhere.

The City of Cape Town (hereinafter 'the City') promotes the responsible use of alternative water sources so as to minimise the use of municipal drinking water from our dams, save money for consumers in the longer term, and increase water security. This is part of the City's drive towards water resilience, recognising that unreliable rainfall has become the 'new normal'. However, there are health and environmental risks associated with installation and use of alternative water systems therefore they need to be well managed and regulated.

For this reason, the City has produced these guidelines to assist residents and businesses to safely install and use of alternative water systems. (Although this document does not have official legal status, it does point to the relevant legislation and regulations, as well as best practices.)

For the purpose of these guidelines, 'alternative water systems' include greywater, rainwater, groundwater from boreholes, wellpoints or springs, surface water taken directly from streams/rivers and treated effluent (from the City's wastewater treatment works). The guidelines also cover so-called 'basement water' – water that seeps into building basements in some areas of Cape Town, particularly in the Foreshore area of the city centre, which is situated below what used to be the sea level. While this basement water has traditionally been pumped out and discharged into the sewer or stormwater system, many buildings have now started to recycle it as a resource, for example for the flushing of toilets.



These guidelines are intended for households and businesses interested in installing smaller-scale alternative water systems that involve plumbing into the building's water network for permanent, seasonal[1] or temporary use.

Serving as a general guide, this document does not fully address the more complex systems of larger users such as industry. While the same principles would apply to more complex systems, specialist expertise should be sought.

These first-edition guidelines do not focus on the manual bucketing of greywater, although tips for such greywater reuse are included in Annexure 1, with future editions to follow on **www.capetown.gov.za/thinkwater**. Neither do the guidelines pertain to water produced by desalination plants, atmospheric water-generating systems ('water from air') or (black) wastewater treatment on site ('package plants'). Use of these options is fairly limited at this stage and requires specialist advice. The key principles stated in the executive summary would however still apply. To enquire about these kinds of alternative water systems, please e-mail the City on **water@capetown.gov.za**. For more information on small-scale collection and use of seawater for household and swimming pool purposes, consult the City's website on **http://cct.gov.za/uqeSY**.

These guidelines are intended to ensure that residents and businesses install greywater, rainwater, groundwater, basement water and treated effluent systems that do not contaminate drinking water or pose any human health or environmental risks. As such, the guidelines align with current legislation, including the City's water restrictions and Water By-law. Updated versions will be published on **www.capetown.gov.za/thinkwater**.

In conditions of drought, alternative water systems should prioritise essential indoor uses (such as toilet flushing instead of garden irrigation) and must comply with all regulatory requirements. Note, however, that the installation and use of alternative water is undertaken entirely at the consumers' own risk. The City is not liable for any consequential damage or loss arising from it.

[1] For example, some would harvest rainwater during the winter rainfall months only, operating the system for the duration of the season until the rainwater runs out, unless sufficient storage is installed to cover use for the whole year.

2. LEGISLATIVE OVERVIEW AND ALIGNMENT

The Bill of Rights contained in the Constitution of the Republic of South Africa (1996) affords all South Africans the right of access to sufficient water. Water is a scarce resource and is critical to all aspects of life, and must therefore be carefully managed for the benefit of all.

The resource is highly regulated in South Africa. Government manages water on behalf of everyone in the country in terms of two primary laws that followed on from the Constitution, namely the National Water Act (1998) and the Water Services Act (1997).

The National Water Act outlines government's approach to water resource management and entrusts the national Department of Water and Sanitation (DWS) as the custodian of this national resource. DWS has overall responsibility for, and authority over the use, flow and control of water. Water resources under the control of national DWS include all naturally occurring resources, such as rivers, streams, aquifers, wetlands and groundwater, as well as bulk supply infrastructure, such as dams. The equitable allocation of water for beneficial use and sustainability is among the important underlying principles of DWS's mandate.

The Water Services Act stipulates various institutional arrangements, including Water Services Authorities, Providers and Intermediaries, along with their corresponding responsibilities and regulatory frameworks.

The City is both a Water Services Authority and Provider, as it is responsible for not only ensuring access to water services, but also providing water services to consumers, including other water service institutions. This means that the City has the statutory responsibility and is held accountable for providing Cape Town with access to treated water that meets the SANS 241 quality standard for 'potable' drinking quality water. Failure to maintain the quality of the municipal water supply to this standard, or the unlawful use of water, poses significant health risks. This is especially true for water use that involves close contact and ingestion such as drinking, cooking and body washing, which are called 'domestic use' in the City's Water By-law.

The legal responsibility for drinking quality water cannot be delegated to consumers or other entities for all water uses (often called going 'off-grid'), unless by special legal arrangement with the City. Exceptions are made for large residential developments and businesses that enter into a contract with the City to operate as Water Service Intermediaries to provide drinking quality water to those visiting, living or working at their premises. This water is subject to strict treatment conditions and must be closely monitored.

Note that the City's Water By-law has been amended in 2018, but most of the provisions relating to the use and installation of alternative water systems have been in place for years in previously gazetted versions from 2006 and 2010.

Apart from the two Acts stated above and the City's Water By-law, other national standards and local by-laws that are directly applicable to alternative water installations in Cape Town include the following:

- SANS 10252-1:2016 (Edition 3.1) for water supply and drainage for buildings Part 1: Water supply installations for buildings, including the materials, layout and installation of overflow pipes, terminal water fittings, back-flow preventers and storage tanks
- SANS 10252-2:2012 for water supply and drainage for buildings Part 2: Drainage installations for buildings
- SANS 1186-1:2015 for symbolic safety signs Part 1: Standard signs and general requirements
- SANS 1808-15:2011 for the water supply and distribution system components Part 15: Mechanical back-flow
- SANS 10140-3:2003 for the identification of colour markings
- SANS 1091:2012 for the national colour standard
- SANS 10299 Parts 1 to 9 for the maintenance and management of groundwater resources
- SANS 2001-CC2: 2007 for minor concrete works, such as a concrete base for a rainwater tank
- The City's Municipal Planning By-law (2015), specifically as it relates to building regulations which apply the erection of some structures and the connection of certain systems to water installations. Note that the requirements for building plan approval are regularly amended
- The City's Treated Effluent By-law (2010)
- The City's Stormwater Management By-law (2005)
- The City's Wastewater and Industrial Effluent By-law (2013)
- The National Building Regulations and Building Standards Act 103 of 1977 and its associated regulations and standards, in particular SANS 10400

Section 6 of this document contains the national and local government requirements for the authorisation, registration and licensing of different types of alternative water systems. Note, however, that regulatory requirements are constantly updated, particularly so in drought conditions. National DWS has for example issued a media statement on boreholes and gazetted a notice constituting a binding general authorisation under the National Water Act, on limitations and related matters around borehole, wellpoint and surface water (rivers and streams). This took effect on 12 January 2018 and includes the following requirements:

- All water sector groups and individuals who abstract surface or groundwater must install electronic water-recording, monitoring or measuring devices. The volumes of water abstracted must be reported on a weekly basis to **metering@dws.gov.za** every Monday before 12:00.
- Groundwater abstraction in the Cape Town catchment area (for domestic and industrial use) must reduce by 45%.
- DWS's permission is required to sell or buy borehole or wellpoint water.

In addition, owners of properties located close to the sea or where desalination could be feasible should note that the legislation governing desalination is complex. Applicable laws include the National Environmental Management Act (1998), the National Environmental Management: Protected Areas Act (2003), the National Environmental Management: Waste Act (2008), the City's Municipal Planning By-law (2015), Stormwater Management By-law (2005), Wastewater and Industrial Effluent By-law (2013) and Integrated Waste Management By-law (2009). Not all legislation is applicable in all cases.

Triggers determining which laws would apply include the location and size of the intended desalination plant, and the quality of the brine that needs to be discharged. For enquiries about the regulatory requirements applicable to desalination plants, e-mail **water@capetown.gov.za** or approach the national Department of Environmental Affairs.

In preparing these guidelines, a range of policy, legislative, research and guideline documents from relevant organisations and other countries have also been considered. These are listed in the bibiliography at the back.

Note, however, that the use of non-drinking water, including greywater and other alternative water sources, is entirely at consumers' own risk. As stated in the Water By-law, the City is not liable for any consequential damage or loss arising directly or indirectly from such water use.

3. ALTERNATIVE WATER SOURCES EXPLAINED

Rainwater

Rainwater is droplets that have condensed from atmospheric water vapour and fallen from the sky. In Cape Town, most rainfall occurs in winter.

Rainwater harvesting is the process of capturing rainfall runoff from roof surfaces via gutters into a storage tank. Sometimes, it is also directed straight to a pool or garden via gravity feed in a pipe or plastic sleeve.

As unreliable rainfall will be our 'new normal' going forward, it is essential that much more of our valuable rainwater is captured for use. Rainwater has the benefit of being a relatively 'low-risk' alternative water source in terms of levels of contaminants (as opposed to greywater, for example). In addition, its use is not subject to licensing by DWS. However, the rainfall season can be short and unreliable, and some parts of Cape Town receive more rain than others. Rainwater storage also has cost and space implications.

Storage of a few thousand litres of rainwater may not last long if it is used as the sole source for traditional-style garden irrigation during Cape Town's dry summer months. Yet it can supply sufficient quantities for indoor uses, such as toilet flushing, for many months of the year.

These variables affect financial viability, and larger-scale systems may not be affordable for everyone.

Rainwater quality varies. In urban settings, it is likely to contain higher levels of contaminants from air pollution. Untreated rainwater (i.e. that has not had any chemical or other treatment) should at least be filtered to prevent solids such as leaves or bird and rodent droppings from entering the rainwater tank or storage reservoir. Treatment methods vary, and depend on the intended use and the water quality standards prescribed for that use.

Rainwater harvesting is different from stormwater harvesting (see definition for stormwater below). In future, it is essential that much more of our rainwater is captured for use on properties. In addition, the City needs to adopt water-sensitive urban design[2] principles to use a proportion of our stormwater as a water resource, without having a negative impact on the environment (i.e. taking limited quantities only). Surfaces should be permeable (not hard-paved) wherever possible so that rainwater can seep down into the ground and recharge our aquifers. If groundwater resources are not sufficiently recharged, they run the risk of being depleted or being intruded by seawater (ingress), which would result in environmental challenges.

[2] Water-sensitive urban design (WSUD) is a way of planning and designing urban areas to better utilise stormwater (and other valuable water resources), thereby reducing the pollution it can cause to our rivers and oceans.

Groundwater: boreholes, wellpoints and springs

Groundwater comes from below the earth's surface. It is stored in spaces within sub-surface sand/soil and rock formations known as aquifers. DWS defines an aquifer as "a geological formation that has structures or textures that hold water or permit appreciable water movement through them". An aquifer is generally regarded as such when its underground water deposit can yield a usable quantity of water. Aquifers have inert (built-in) storage, which usually stays below the surface.[3]

Springs are groundwater that flows up onto the surface, either throughout the year or for part of the year only. Springs can form an independent watercourse (e.g. a stream) or can flow into an existing watercourse.

Boreholes and wellpoints are holes drilled into the ground to extract groundwater from an aquifer below. A wellpoint provides access to shallow groundwater, while boreholes are drilled at a depth of more than 20 m to extract deeper groundwater.

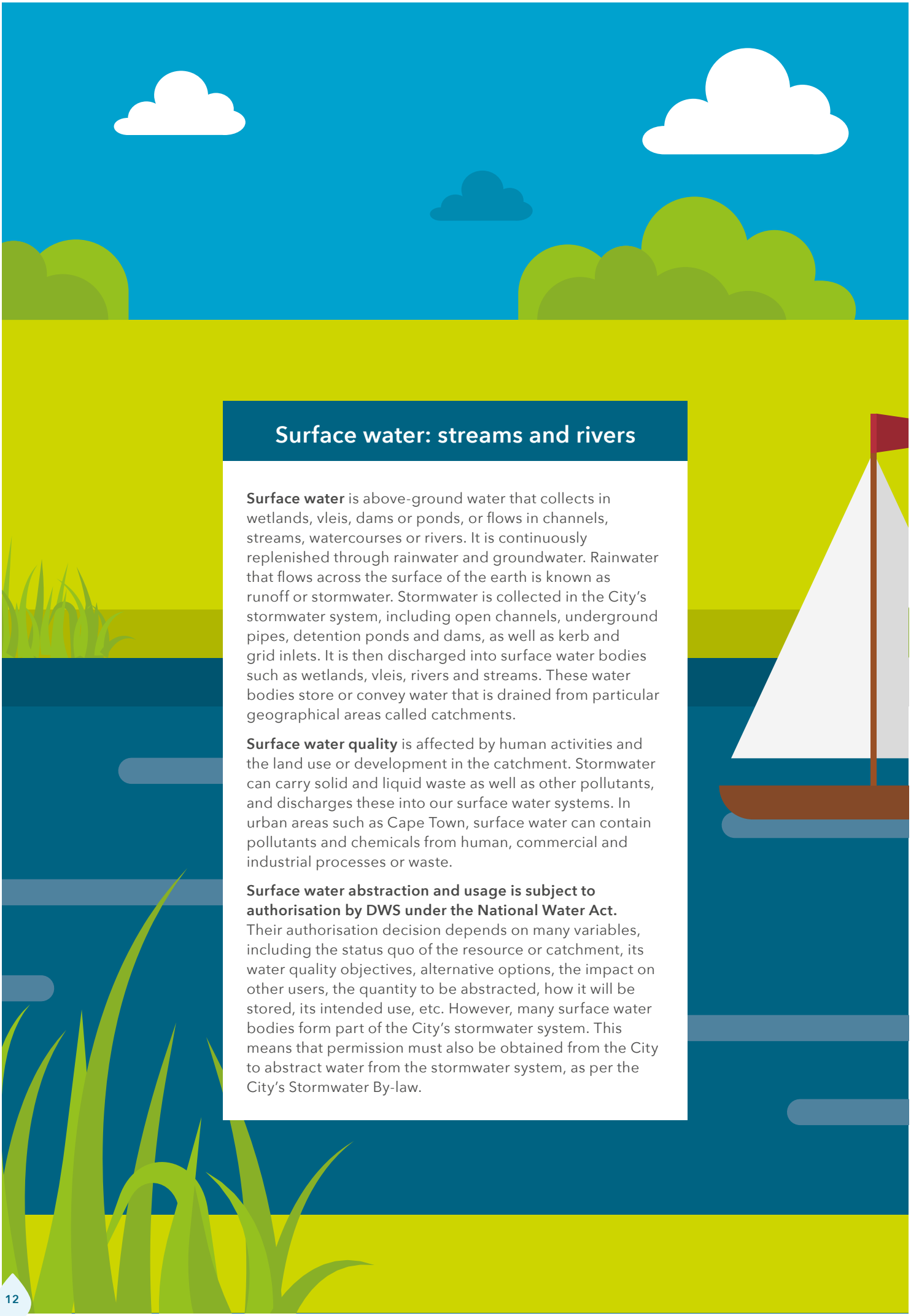
The quality of groundwater is affected by the geology and land use in the catchment area from where it is fed. Groundwater often contains corrosive minerals that can damage plumbing equipment, and may also cause discolouration if not treated e.g. a rust colour if not de-ionised. In urban areas such as Cape Town, groundwater can also contain pollutants and chemicals from human, commercial and industrial processes and waste, including factory waste, graveyards, informal settlements without plumbed sewage, illegal dumping and sewer pipe leaks. These contaminants may infiltrate and pollute the groundwater below.

If the feeder area is not contaminated, groundwater can be a relatively 'low-risk' source. Yet it is unpredictable, as underground sewer spills or other factors that may not be obvious from above the ground can also affect the quality of groundwater. Treatment of groundwater varies, but often includes deionising or similar methods to remove any metal content.

If managed poorly, groundwater can become contaminated and be depleted by over-extraction. Over-extraction of groundwater can result in the lowering of groundwater levels, which will affect supply to other users, reduce water levels in streams and rivers, and cause other environmental harm such as reducing the functioning of ecosystems and the services they provide.

Groundwater use is subject to licensing under the National Water Act and approval by DWS, being the custodian of groundwater in South Africa. The National Water Act stipulates the licensing needs, which depend on the intended use and quantities abstracted and stored.

[3] If the groundwater level rises sufficiently during the wet season aquifers may however also drain into watercourses above ground.



Surface water: streams and rivers

Surface water is above-ground water that collects in wetlands, vleis, dams or ponds, or flows in channels, streams, watercourses or rivers. It is continuously replenished through rainwater and groundwater. Rainwater that flows across the surface of the earth is known as runoff or stormwater. Stormwater is collected in the City's stormwater system, including open channels, underground pipes, detention ponds and dams, as well as kerb and grid inlets. It is then discharged into surface water bodies such as wetlands, vleis, rivers and streams. These water bodies store or convey water that is drained from particular geographical areas called catchments.

Surface water quality is affected by human activities and the land use or development in the catchment. Stormwater can carry solid and liquid waste as well as other pollutants, and discharges these into our surface water systems. In urban areas such as Cape Town, surface water can contain pollutants and chemicals from human, commercial and industrial processes or waste.

Surface water abstraction and usage is subject to authorisation by DWS under the National Water Act. Their authorisation decision depends on many variables, including the status quo of the resource or catchment, its water quality objectives, alternative options, the impact on other users, the quantity to be abstracted, how it will be stored, its intended use, etc. However, many surface water bodies form part of the City's stormwater system. This means that permission must also be obtained from the City to abstract water from the stormwater system, as per the City's Stormwater By-law.

Greywater

Greywater is untreated wastewater that comes from baths and showers (body washing) and hand-washing basins. Laundry water from washing machines or the hand washing of clothing qualifies as reusable greywater only if environmentally friendly detergents[4] have been used, unless it is discharged into the sewer only, for example for the flushing of toilets. Typically, 50-80% of indoor water used in the home can be reused as greywater.

Greywater is not toilet water (which contains faecal matter and germs/pathogens), water from kitchen sinks and dishwashers (which contains grease, fats, oils, bacteria and food/other solid particles) or water from spas, jacuzzis and pools.

Greywater is highly variable in quality and can often be relatively 'high-risk'. Untreated greywater must be collected/stored and used within 24 hours. Any greywater stored for more than 24 hours needs to be filtered and treated in accordance with its intended use. Depending on its source, greywater can typically contain bacteria, organic material, oil and grease, soap and detergent residue, pesticide residue, dirt, lint, sodium, nitrates and phosphates (from detergent), high salt and pH levels, bleach, and hair and skin particles.

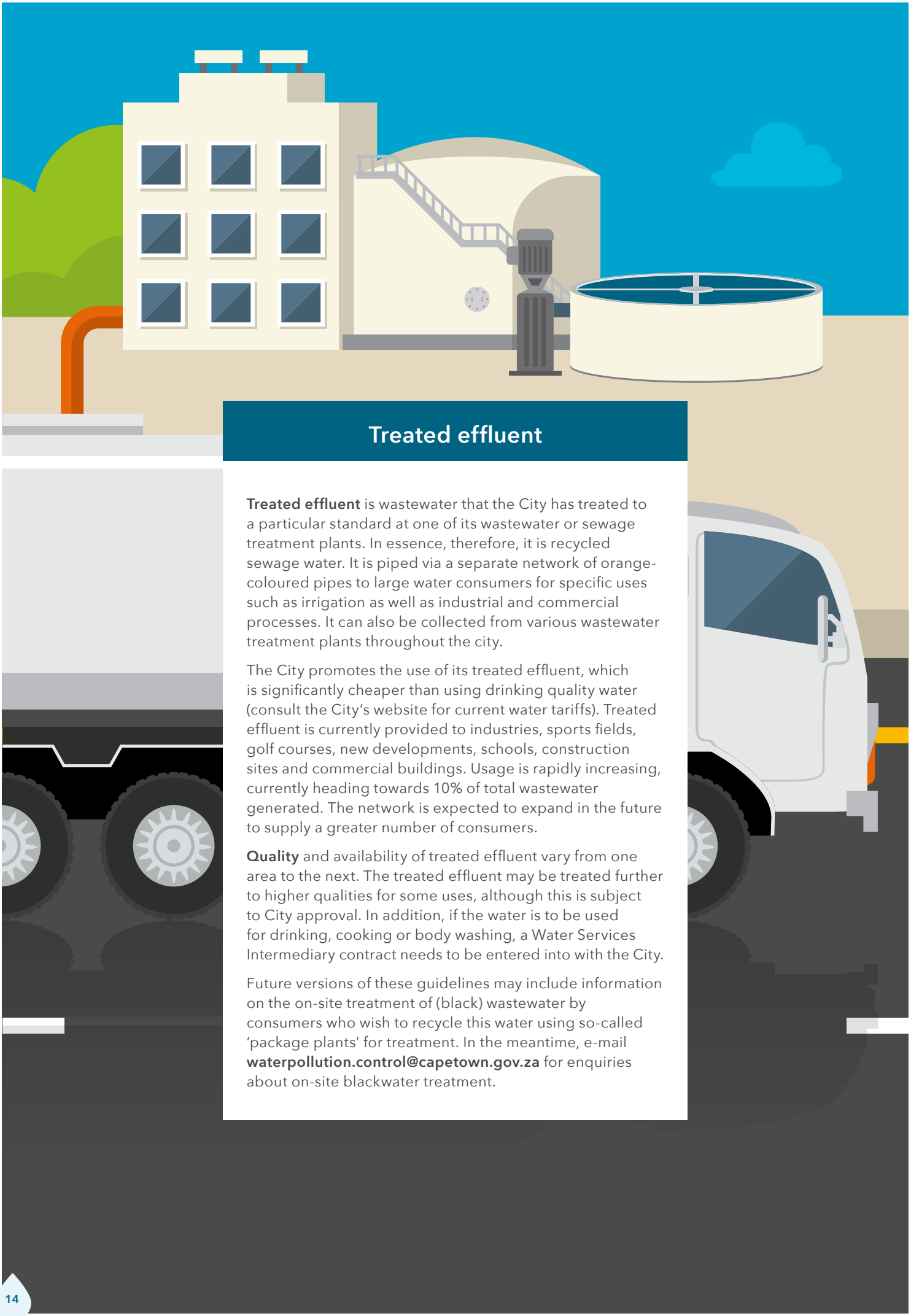
Treated greywater has been through a process of filtration and disinfection, which means it is of a better quality. Typically, treated greywater is filtered before or as it is collected in a temporary storage tank. From there, it is dosed and/or treated further, depending on the intended use and the associated water quality standards required. While this treatment removes harmful substances from the greywater, the recommendation still is to use it within 24 hours wherever possible.

Because it often contains harmful bacteria, the use of greywater is associated with some significant health and hygiene risks, which need to be well managed.

Greywater usage is not subject to authorisation or licensing by DWS. However, the fitting of greywater systems if connected to a water installation does require the City's approval.

For more information, see Annexure 1 on the safe use of greywater, which outlines conditions for greywater use in various applications.

[4] Detergents with low-phosphate concentrations.



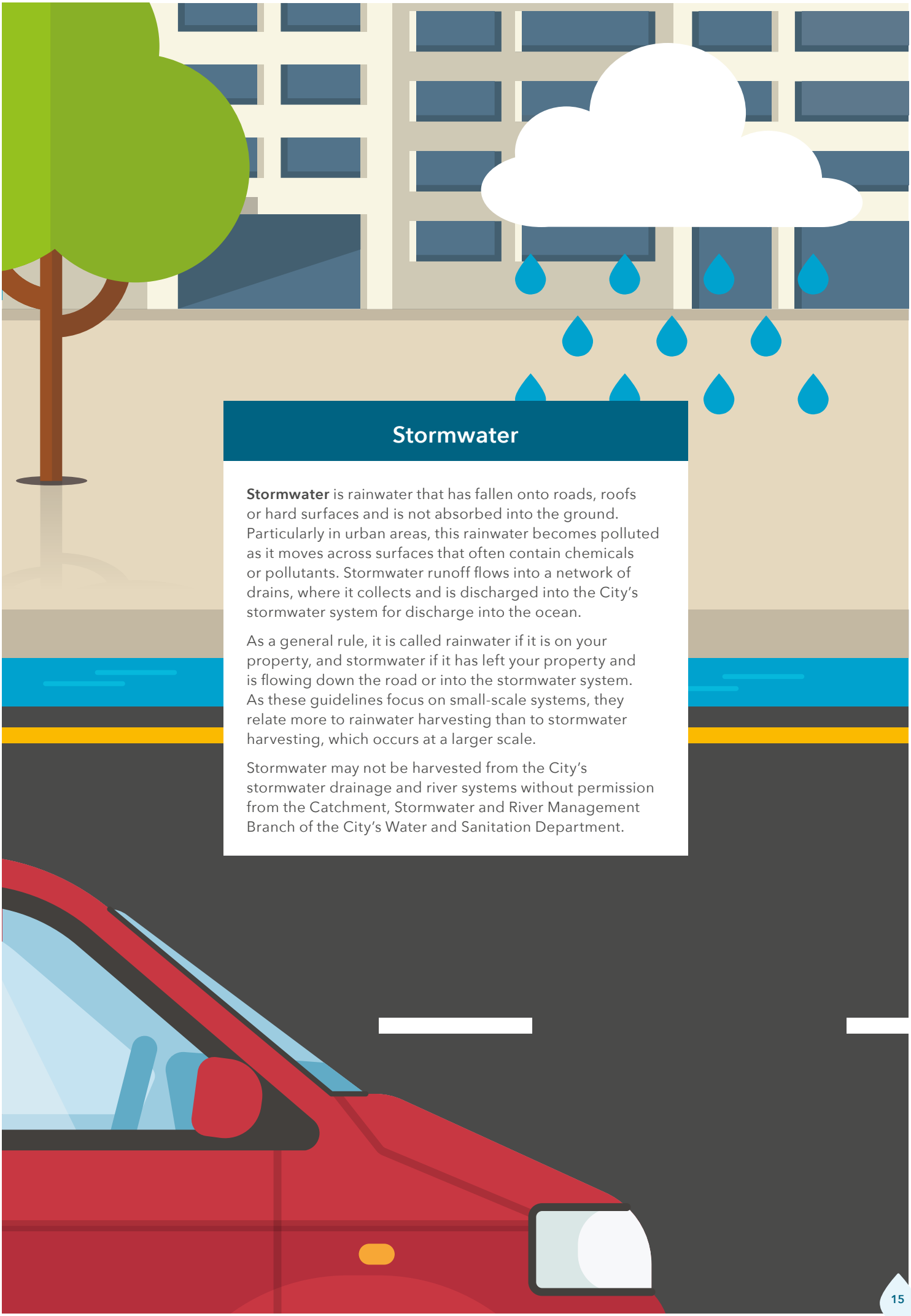
Treated effluent

Treated effluent is wastewater that the City has treated to a particular standard at one of its wastewater or sewage treatment plants. In essence, therefore, it is recycled sewage water. It is piped via a separate network of orange-coloured pipes to large water consumers for specific uses such as irrigation as well as industrial and commercial processes. It can also be collected from various wastewater treatment plants throughout the city.

The City promotes the use of its treated effluent, which is significantly cheaper than using drinking quality water (consult the City's website for current water tariffs). Treated effluent is currently provided to industries, sports fields, golf courses, new developments, schools, construction sites and commercial buildings. Usage is rapidly increasing, currently heading towards 10% of total wastewater generated. The network is expected to expand in the future to supply a greater number of consumers.

Quality and availability of treated effluent vary from one area to the next. The treated effluent may be treated further to higher qualities for some uses, although this is subject to City approval. In addition, if the water is to be used for drinking, cooking or body washing, a Water Services Intermediary contract needs to be entered into with the City.

Future versions of these guidelines may include information on the on-site treatment of (black) wastewater by consumers who wish to recycle this water using so-called 'package plants' for treatment. In the meantime, e-mail **waterpollution.control@capetown.gov.za** for enquiries about on-site blackwater treatment.



Stormwater

Stormwater is rainwater that has fallen onto roads, roofs or hard surfaces and is not absorbed into the ground. Particularly in urban areas, this rainwater becomes polluted as it moves across surfaces that often contain chemicals or pollutants. Stormwater runoff flows into a network of drains, where it collects and is discharged into the City's stormwater system for discharge into the ocean.

As a general rule, it is called rainwater if it is on your property, and stormwater if it has left your property and is flowing down the road or into the stormwater system. As these guidelines focus on small-scale systems, they relate more to rainwater harvesting than to stormwater harvesting, which occurs at a larger scale.

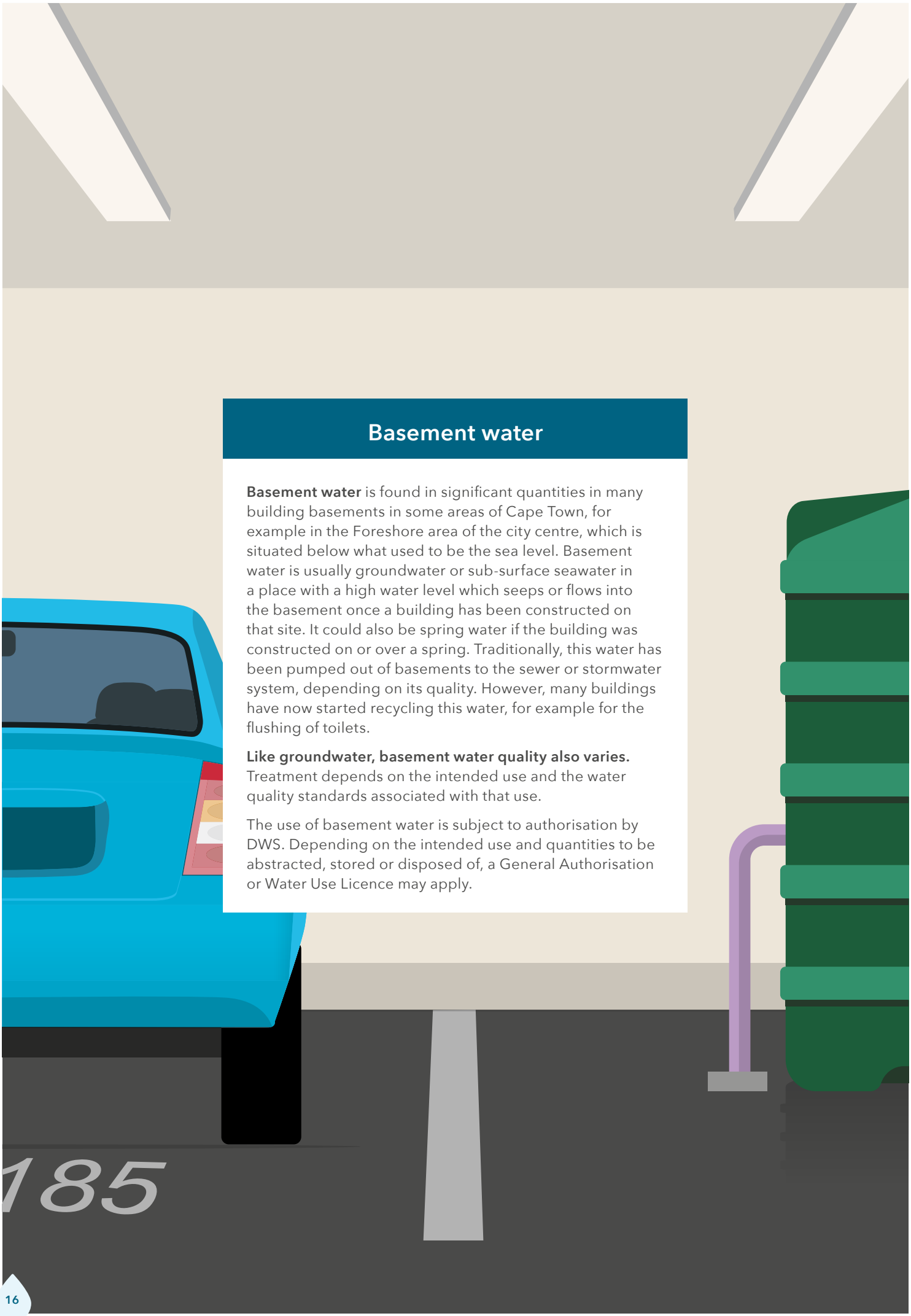
Stormwater may not be harvested from the City's stormwater drainage and river systems without permission from the Catchment, Stormwater and River Management Branch of the City's Water and Sanitation Department.

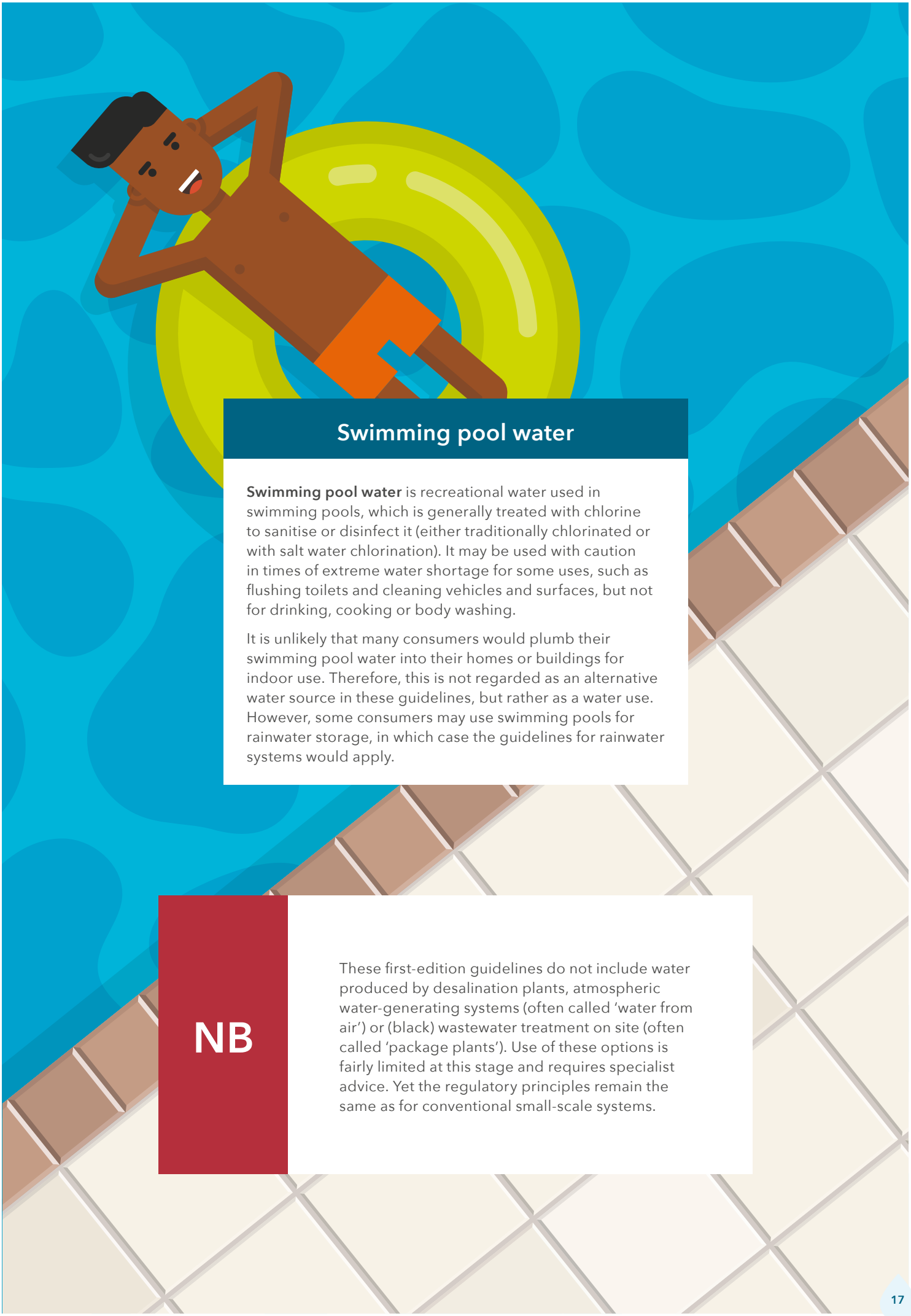
Basement water

Basement water is found in significant quantities in many building basements in some areas of Cape Town, for example in the Foreshore area of the city centre, which is situated below what used to be the sea level. Basement water is usually groundwater or sub-surface seawater in a place with a high water level which seeps or flows into the basement once a building has been constructed on that site. It could also be spring water if the building was constructed on or over a spring. Traditionally, this water has been pumped out of basements to the sewer or stormwater system, depending on its quality. However, many buildings have now started recycling this water, for example for the flushing of toilets.

Like groundwater, basement water quality also varies. Treatment depends on the intended use and the water quality standards associated with that use.

The use of basement water is subject to authorisation by DWS. Depending on the intended use and quantities to be abstracted, stored or disposed of, a General Authorisation or Water Use Licence may apply.





Swimming pool water

Swimming pool water is recreational water used in swimming pools, which is generally treated with chlorine to sanitise or disinfect it (either traditionally chlorinated or with salt water chlorination). It may be used with caution in times of extreme water shortage for some uses, such as flushing toilets and cleaning vehicles and surfaces, but not for drinking, cooking or body washing.

It is unlikely that many consumers would plumb their swimming pool water into their homes or buildings for indoor use. Therefore, this is not regarded as an alternative water source in these guidelines, but rather as a water use. However, some consumers may use swimming pools for rainwater storage, in which case the guidelines for rainwater systems would apply.

NB

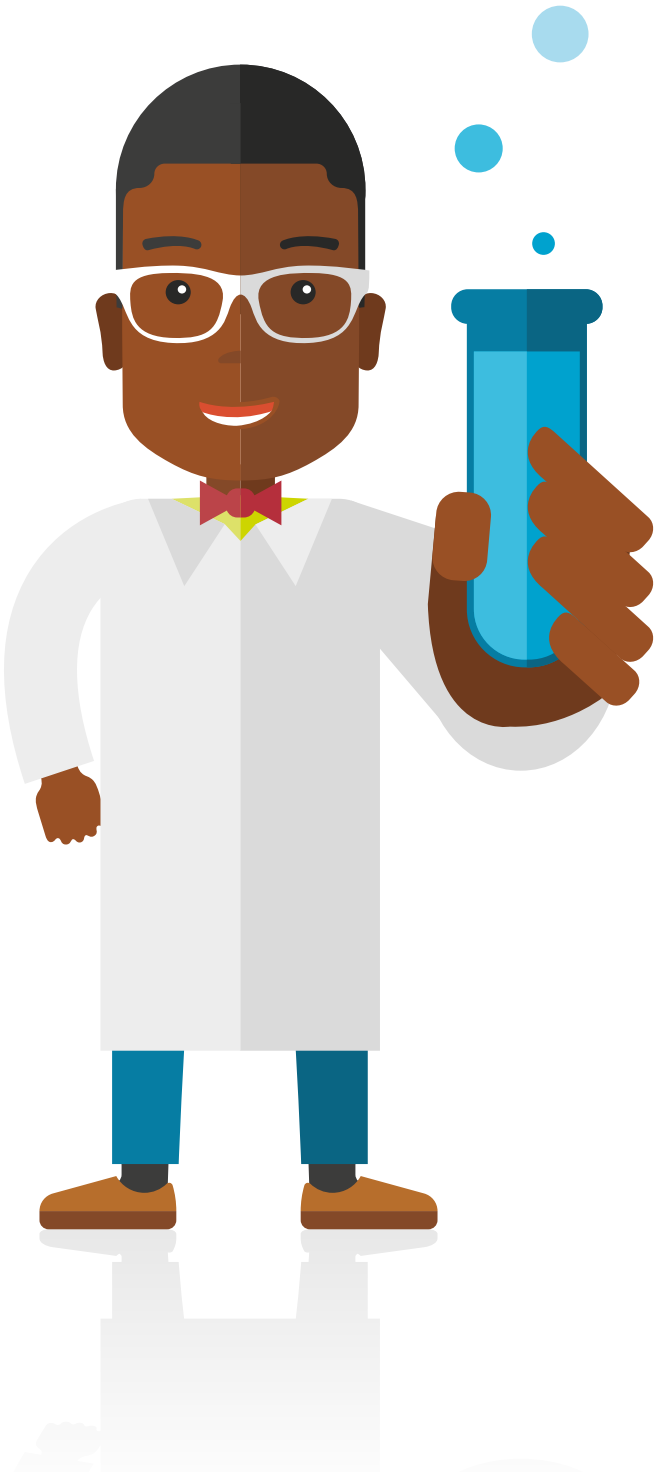
These first-edition guidelines do not include water produced by desalination plants, atmospheric water-generating systems (often called 'water from air') or (black) wastewater treatment on site (often called 'package plants'). Use of these options is fairly limited at this stage and requires specialist advice. Yet the regulatory principles remain the same as for conventional small-scale systems.

4. APPROPRIATE USES, QUALITY AND TREATMENT

Quality is key to use. The quality of an alternative water source, and how it is stored and managed, will determine where and how it can be used.

Usage is governed by national guidelines, legislation and regulations that were developed to protect people from serious health risks and protect our environment.

The appropriate and permitted set of uses for each alternative water source is outlined in the table in section 4.1 alongside. This is to be read in conjunction with the risk and water quality matrix contained in section 4.2, which shows the water quality recommended or required for each water use.



4.1. Appropriate uses

Rainwater

Rainwater should always be filtered to remove solids. It can be used untreated or treated, although the intended use will determine what standard of water quality is required. Testing is needed to first determine water quality, after which its viability for various uses can be assessed. Treatment may make rainwater suitable for a particular use (refer to the risk and quality matrix in section 4.2).

Rainwater quality depends on a number of factors. These include roof material, cleanliness of gutters, and the proximity of trees, bird roosts and industrial areas. Bird and rodent droppings are possible contaminants. Regular maintenance is critical to ensure that relatively clean rainwater is harvested and stored.

Rainwater quality varies throughout the year because it is affected by the quantity of rainfall in relation to possible contaminants. Stored rainwater is more likely to be of a better quality during wet months than dry months, as rainfall will have diluted possible contaminants that may have collected.

Treatment systems vary from simple chlorination to ozonation, while distribution systems vary from a simple gravity system to more complex arrangements involving pumps and timers.

Untreated rainwater that has had a basic level of filtration (to remove solid matter and/or particles) may be used in moderation for:

- toilet flushing;
- cleaning vehicles, bins and outdoor surfaces; and
- irrigation – limited depending on restrictions in place at the time.

Treated rainwater reduces any possible health risks. If found to be of a sufficient quality (according to the matrix in section 4.2 below), it can be used with caution and with City permission for connecting it to a building's water installation (plumbing) for:

- laundry washing;
- indoor surface cleaning, such as floors and table or countertops;
- water-cooled air-conditioning systems (HVAC);
- water features; and
- topping up of swimming pools and ponds.

The City's current Water By-law does not allow rainwater – whether treated or untreated – to be used for what is called 'domestic' purposes, namely for drinking, cooking, food preparation or body washing (ablution). This is due to the City's statutory responsibility for water quality in uses that involve close human contact and ingestion, as well as for the associated potential health risks.

DID YOU KNOW? A 5 000 ℓ tank used primarily for toilet flushing in winter rainfall areas can save up to 15% on annual water use.

Groundwater: boreholes, wellpoints, springs and basement water

Groundwater is of varying quality and often has a high metal content. Testing is needed to first determine water quality, after which its viability for various uses can be assessed. Groundwater may be used either treated or untreated, depending on the test results and intended use. Treatment may make groundwater suitable for a particular use (refer to the risk and quality matrix in section 4.2 below).

With the relevant City permission (for plumbing installation compliance) and DWS authorisation (for the actual taking of the water) as well as some level of treatment, groundwater may be used with caution for:

- toilet flushing;
- laundry washing;
- indoor surface cleaning;
- cleaning vehicles, bins and outdoor surfaces;
- irrigation – limited depending on restrictions in place at the time;
- topping up of swimming pools and ponds;
- water features; and
- water-cooled air-conditioning systems (HVAC).

However, untreated groundwater may have a high metal content. This is normally corrosive and would discolour surfaces or laundry and react with the plumbing materials, causing damage to pipes and pumps. Appropriate treatment, such as deionisation, will be required in many cases. Specialist advice needs to be sought.

Note that the type of use will depend on the City's water restrictions in place at the time. In times of severe water shortage, irrigation using groundwater may be banned or limited, while only more essential uses such as toilet flushing may be permitted.

Usage levels will also depend on DWS's regulatory requirements in effect at the time. For example, DWS gazetted a notice on limitations and related matters around borehole, wellpoint and surface water (rivers and streams) which took effect on 12 January 2018 and it restricts use, and requires metering and reporting on usage.

BASEMENT WATER: For all intents and purposes, water that has seeped into building basements is considered to fall into the category of groundwater in terms of appropriate uses.

Surface: streams and rivers

The quality of surface water taken directly from a water resource may pose a high risk for human health, similar to stormwater. Testing is needed to first determine water quality, after which its viability for various uses can be assessed. Treatment may make surface water suitable for a particular use (refer to the risk and quality matrix in section 4.2 below).

With the relevant City permission (for plumbing installation compliance) and DWS authorisation (for the actual taking of the water) as well as some level of treatment, surface water may be used for:

- toilet flushing;
- laundry washing;
- indoor surface cleaning;
- cleaning vehicles, bins and outdoor surfaces;
- irrigation – depending on restrictions in place at the time;
- topping up of swimming pools and ponds;
- water features; and
- water-cooled air-conditioning systems (HVAC).

Usage levels will also depend on DWS's regulatory requirements in effect at the time. For example, DWS gazetted a notice in the form of a binding general authorisation under the NWA, on limitations and related matters around borehole, wellpoint and surface water (rivers and streams), which took effect on 12 January 2018. It restricts the volume of water used, and requires metering and reporting on usage.

Greywater

Greywater can be used untreated yet filtered (to remove solid particles such as hair) under certain conditions for:

- toilet flushing;
- cleaning vehicles; and
- garden irrigation.

The specific conditions are very important to note, and are contained in Annexure 1 on the safe use of greywater.

The key principle is that any greywater should be used within 24 hours wherever possible. If it is stored for longer than 24 hours, it has to be treated. Unlike simple 'bucketing', plumbing installations for greywater are more likely to include some form of filtration and treatment.

A benefit of greywater is its availability throughout the year, unlike rainwater, which is seasonal and unreliable. Some greywater sources are of a better quality than others. For example, the water discharged from the rinse cycle of washing machines is of a better quality than that coming from the soapy cycle, and can potentially be collected for a broader range of reuses.

Greywater should preferably be treated, as this lowers any potential health risks. Greywater systems vary, ranging from simple gravity systems to more complex arrangements involving storage, pumps, timers and several processes of filtration and treatment. Biological treatment methods achieve certain levels of quality, while nano-filtration takes it a step further, and processes such as reverse osmosis are even more advanced. Water treatment experts should be consulted.

With specialist treatment and disinfection, as well as with City permission (for plumbing installation compliance), greywater can be used for toilet flushing, vehicle cleaning and garden irrigation, as well as:

- laundry washing;
- cleaning bins and outdoor surfaces;
- other irrigation – depending on restrictions in place at the time and whether plants can handle greywater;
- water features; and
- water-cooled air-conditioning systems (HVAC).

The use of greywater for indoor surface cleaning or the topping up of swimming pools and ponds is generally not advised, unless it has been through full treatment to SANS 241 standards.

Treated effluent

The current quality of the City's treated effluent is not sufficient for drinking, cooking or body washing (defined as 'domestic' uses in the Water By-law).

The City's treated effluent may be provided to large consumers for irrigation and operational uses such as:

- irrigation of lawns/fields and some plants;
- dust control on construction sites;
- cleaning or flushing of stormwater and sewer pipe networks;
- washing bins;
- cleaning streets;
- fire-fighting applications; and
- toilet flushing.

In future, the City's treated effluent may be treated further to a higher quality standard, which may render it suitable for other purposes.

Treated effluent infrastructure is currently only available for direct reticulation in certain areas of the city. Therefore, reticulated access to the City's treated effluent depends on where a property is located in relation to the existing network. (Note: Some City wastewater treatment works have collection points where large consumers can collect wastewater in tankers. Temporary standpipes are also available, such as for construction sites. For more information, see **www.capetown.gov.za/treated-effluent**.)

Future versions of these guidelines may include the on-site treatment of (black) wastewater by consumers who wish to recycle this water using so-called 'package plants' for treatment.

4.2. Matrix of risk and water quality

The quality of alternative water sources varies depending on a range of factors. These include the pollutants the water is exposed to, the activities in the catchment area it comes from, how it is stored, etc. These factors are known to be unpredictable and change over time. Therefore, it is essential to understand what quality of water is required for a particular use, and to ensure that the alternative water source is tested and, if need be, treated to the required quality standards to make it suitable for that use.

While section 4.1 above covered some water quality risks and concerns for each type of alternative water source, the matrix in this section seeks to bring together the risk levels and water quality requirements for a range of different water sources and water uses. Aggregate risk levels are indicated by colours, while the required water quality for each use is indicated by a number that corresponds to a particular section of the national water quality guidelines or other, relevant legislation, where applicable. The key and explanations of the various colours and numbers appear below the matrix.

DWS's Water Quality Guidelines introduced in 1996 have laid a foundation for the recommended water quality required for most water uses in South Africa. The five-volume document deals at length with the recommended quality for each usage category.

The City strongly recommends that the DWS 1996 Water Quality Guidelines be followed as best practice, as they were developed to avoid health risks.

Subsequent to those guidelines, the SANS 241 national standard for water quality was developed. It specifies the required standard for drinking quality water provided to consumers by Water Service Institutions such as the City, as well as for other uses that involve close human contact and possible ingestion (including water features and swimming pools – see **www.sabs.co.za**).

The City's Water By-law specifies that no alternative water, whether treated or untreated (not even to SANS 241 standards), may be used for drinking, cooking (including food preparation) and body washing (ablution).

Exceptions are made for large residential developments and businesses that enter into a contract with the City to operate as Water Service Intermediaries to provide drinking quality water to those visiting, living or working at their premises. This water is subject to strict treatment conditions and is to be closely monitored. As the City has a statutory responsibility for water quality in uses that involve close human contact and ingestion, as well as for the associated potential health risks, it has to be extremely cautious when drinking water is provided by another entity.

WATER USES	RAINWATER	GROUND-WATER: Boreholes, wellpoints and springs	SURFACE WATER: Streams and rivers	TREATED EFFLUENT FROM THE CITY	GREYWATER
	TEST FIRST, AND TREAT ACCORDING TO USE				
Plant bed irrigation (subsurface)	4	4		4	4
Fire-fighting	3 (categories 3 & 4)	3 (categories 3 & 4)		3 (categories 3 & 4)	3 (categories 3 & 4)
Vehicle cleaning	3	3		3	3
Food garden (subsurface) and lawn irrigation	4	4		4	4
Outdoor hard-surface cleaning	3 (category 4)	3 (category 4)		3 (category 4)	3 (category 4)
Swimming pools*	SANS 241*	SANS 241*		SANS 241*	SANS 241*
HVAC (heating, ventilation and air conditioning)	3 (all four categories)	3		3	3
Toilet flushing**	**	**		**	**
Fish ponds	1	1		1	1
Indoor surfaces (but not for cleaning kitchen or food preparation surfaces)	1	1		1	1
Laundry washing	1	1		1	1
Cooking, food preparation, kitchen surfaces and dishwashing (culinary purposes)	1	1		1	1
Body washing (ablution)	1	1		1	1
Drinking	SANS 241	SANS 241		SANS 241	SANS 241
Water features (no contact)	1	1		1	1
Water features (e.g. splash parks)**	SANS 241	SANS 241		SANS 241	SANS 241

As far as can be determined, the national legislation and guidelines relating to water quality do not seem to directly mention basement water. Therefore, it is assumed that basement water should be treated in the same way as groundwater and surface water in the above table.

* Swimming pool water quality has to comply with drinking water standards as per SANS 241. Legislated requirements for other aspects of swimming pool management, including water quality maintenance, is determined in the National Environmental Health Norms and Standards for Premises and Acceptable Monitoring Standards for Environmental Health Practitioners, issued in terms of the National Health Act 61 of 2003.

** No water quality guideline available.

The 1996 DWS Water Quality Guidelines also have a Volume 5 for agriculture, in three parts for: livestock watering; aquaculture, and aquatic ecosystems. However, these are not relevant for the urban context which is reflected in the matrix above.

COLOUR CODE	RISK OF USE	WATER QUALITY REQUIRED FOR INTENDED USE	TESTING AND TREATMENT REQUIRED FOR INTENDED PURPOSE
USE WITH DISCRETION	**Low, negligible risk** No direct human contact with water	**Low**	• No testing or treatment required. • Use with discretion.
TEST QUALITY AND TREAT FOR USE(S)	**Moderate risk** Some human contact with water	**Moderate**	• Test water quality. • Check results against national guidelines for intended use, and treat if required. • Treatment may be unlikely.
TEST QUALITY AND TREAT FOR USE(S)	**Medium risk** Greater human contact	**Medium**	• Test water quality. • Check results against national guidelines for intended use, and treat if required. • Treatment is likely.
TEST QUALITY AND TREAT FOR USE(S)	**Very high risk** High levels of contact and human ingestion	**High**	• Test water quality. • Check results against national guidelines for intended use, and treat if required. • A high level of treatment is essential. • Regular quality testing is required to determine ongoing water quality and suitability for use. Filtering and/or treatment will be necessary.
DO NOT USE AT ALL	No alternative water sources may be used for these purposes – as per the City's Water By-law, unless in terms of a contract as a water services intermediary/ provider		

NO. IN MATRIX	CORRESPONDING VOLUME OF THE 1996 DWS WATER QUALITY GUIDELINES
1	Volume 1: domestic use
2	Volume 2: recreational use (2nd edition, 1996) Category 2: full contact (e.g. swimming in uncontrolled water such as sea, river, vleis) Category 2: intermediate contact
3	Volume 3: industrial use (four subcategories)
4	Volume 4: agricultural use (irrigation)

4.3. Water testing

Step 1: Identify the intended use of the water. This will establish which tests are necessary.

Step 2: Select a testing laboratory recognised by the South African National Accreditation System (SANAS). See **http://www.sanas.co.za/**.

Step 3: Some laboratories may collect samples on your behalf, while others may not. Consult laboratories on their options and sampling procedures.

Step 4: Request (a) results, (b) recommendations for the potential use of sampled water, and (c) possible treatment options to improve quality, if required.

Step 5: Compare the results with the summary table of national Water Quality Guidelines to see whether the quality of the source water meets the quality required for the intended use. In other words, check whether the numbers in the test report fall within the permitted ranges for the use you are considering.

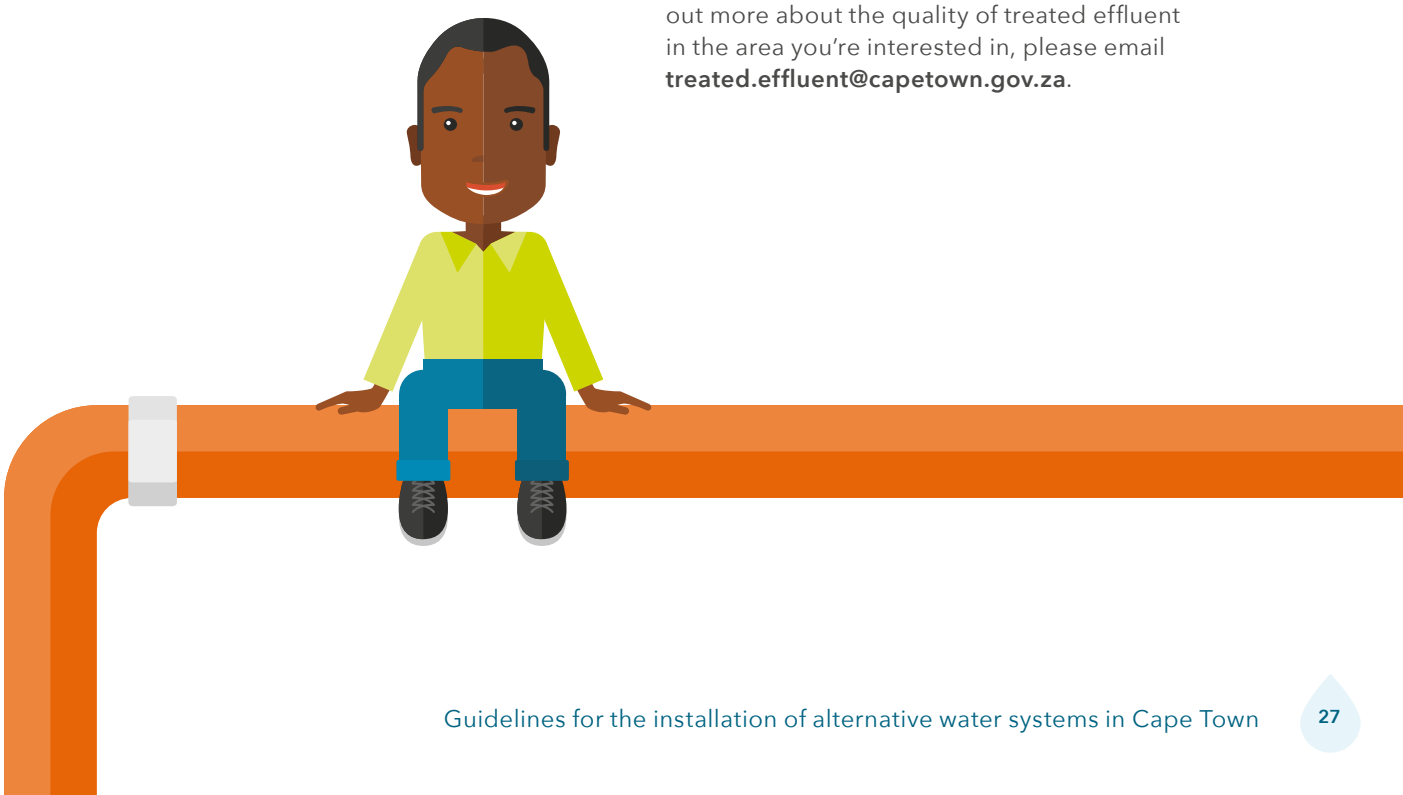
Step 6: If the rest results fall below the water quality standard, and you still want to use it for that purpose, further treatment will be required. Consult a specialist to investigate treatment options, including consulting engineers or suppliers of water treatment systems.

4.4. Water treatment

The quality of water from different sources (e.g. rainwater, greywater and groundwater) varies greatly. Each source has its own characteristics. Therefore, a case-specific approach to water treatment is needed. Water treatment is any process that makes water acceptable for a specific end use. Treatment processes can include, but are not limited to, screening and pre-chlorination, pH adjustment, ultrafiltration, flocculation, reverse osmosis, disinfection and filtration. These processes can be simple, such as chlorination, or more complex, such as ultrafiltration.

The quality of the source water will determine the treatment process as well as the possible end uses. If the test results indicate that the source water does not meet the standards required for the proposed end use, treatment will be required. It is recommended that a specialist be consulted to identify and implement a treatment regime. Where water treatment is not an option, the laboratory or specialist may recommend ways to use the water untreated.

Those who are interested in using the City's treated effluent water should note that there is no one single quality standard to which it is treated. The quality varies depending on which of the City's wastewater treatment works it comes from. Each of them have been authorised for a certain quality by the national DWS, according to a Water Use Licence or Waste Water Permit they have been issued, or according to the General Authorisation as per Section 39 of the Water Act. To find out more about the quality of treated effluent in the area you're interested in, please email **treated.effluent@capetown.gov.za**.



4.5. 'Off-grid' installations

The City's current Water By-law prohibits consumers from using alternative water for any of their domestic needs. There are important reasons why.

Drinking water.

According to national water legislation, the City has the statutory responsibility to provide drinking quality water in Cape Town and is held accountable for this. The City is entrusted with providing drinking quality water treated to SANS 241 standards – which is the only water that may be used for drinking, cooking (and food preparation) and body washing (ablution), for obvious health reasons. The City has the in-house expertise, treatment infrastructure and regular testing regimes in place to provide safe and world-class water, including a dedicated Scientific Services team. Water is treated through a ten-stage process to ensure that it complies with SANS 241. Samples are taken throughout this process. Some are tested hourly or every two hours. Testing includes physical, chemical and bacteriological analysis.

This legal responsibility cannot and should not be handed over to consumers who are not equipped to guarantee SANS 241-quality water for their drinking, cooking and ablution needs on an ongoing basis. If consumers' treatment equipment fails for whatever reason, that would not only pose serious health risks for that particular property, but possibly also public health impacts for the surrounding area. The City does not currently have the capacity to keep checking on the treatment equipment of many off-grid consumers, or to monitor their testing and treatment regimes. Furthermore, current national legislation caters for only certain categories/types of consumers that are eligible for producing their own drinking water.

Sanitation services.

Sanitation services have traditionally been charged as a percentage of the volume of municipal drinking water used, typically at around 70%. However, due to the use of alternative water on properties, there may no longer be any direct relationship between the volume of water consumed through the meter and the volume of sewage discharged. Most alternative water is not metered, but is still discharged down the sewer to go to the City's wastewater treatment plants. Therefore, a different method is required to determine a fair and equitable sanitation charge that would keep the service financially viable and sustainable. This is being considered for future implementation.

The City's current position, therefore, is that the risks and costs associated with consumers going completely 'off-grid' are too high to allow it on a widespread scale. Consumers may use alternative water for purposes such as flushing toilets, irrigating gardens and washing vehicles (as indicated on page 25), provided that they obtain City permission for plumbing installation compliance as well as DWS approval for the actual taking of the water from the source. The City will check whether the required back-flow preventers, signage and colour codes (labelling) are in place and that consumers use alternative water with discretion (see appropriate uses on page 26).

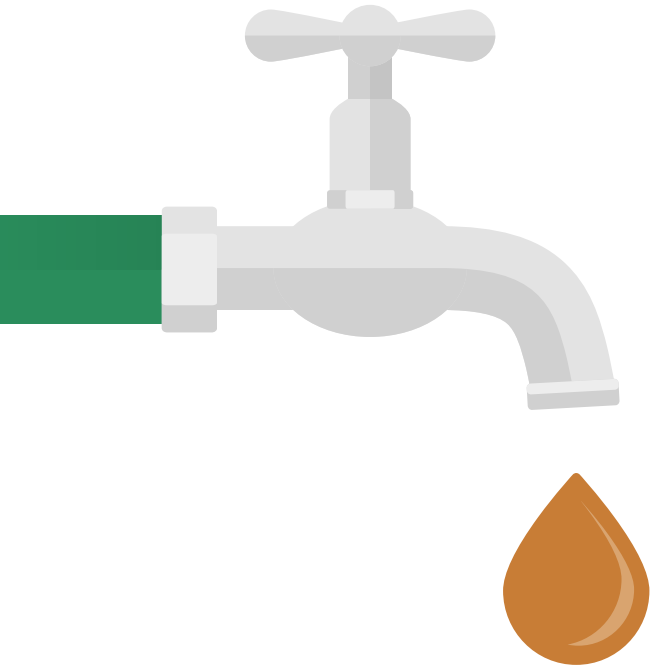
A few large-scale developments or businesses may be authorised to provide drinking water to the people visiting, living or working at their premises. For this purpose, they will have to enter into a contract with the City to operate as a Water Service Intermediary, supplying sufficient proof that they would be able to put in place a treatment and monitoring system to guarantee SANS 241-quality drinking water on an ongoing basis. Consult the City's website at **http://cct.gov.za/AIBNI** to apply to operate as a Water Services Intermediary (WSI).

4.6. Transfer of property ownership

When purchasing a property that already has an alternative water installation in place, the new owner must take responsibility to ensure that he or she receives a sufficient briefing on the operation of the system from the previous owner. The new owner should submit a new application to the City if the alternative water installation has been or is to be changed since the original application (turn to section 6, "Registration and authorisation", for application information).

5. INSTALLATION AND MAINTENANCE TO PREVENT CONTAMINATION

It is essential to prevent any contamination of the drinking water system by the incorrect installation of an alternative water system. As outlined above, the use of alternative water sources poses significant health and environmental risks, which can and must be avoided.



Keep alternative water separate from the municipal drinking water supply system.

It is imperative never to allow alternative water to mix with the municipal drinking water supply, as any possible contamination introduced by alternative water could affect the health of people in the home, office, neighbouring properties as well as the surrounding areas. In terms of section 54 of the City's Water By-law, the owner must provide and maintain measures to prevent entry of any substance which may be a danger to health or may adversely affect the quality of the drinking water into any part of the water system on the premises as well as the municipal drinking water system beyond the premises/property. This means having either a completely separate system with no connection at all, or at least the required level of back-flow prevention as outlined in SANS 1808-15, which is the Reduced Pressure Zone (RPZ) valve back-flow preventer.

A RPZ valve back-flow preventer is regarded as the approved level of back-flow prevention, and an 'air gap' method is permitted as an alternative.

Non-return valves and standard stopcock valves are not sufficient to guarantee that the two types of water are kept separate to prevent contamination.

The specifications and functionality for an RPZ valve back-flow preventer are outlined in SANS 1808-15. If products approved according to this standard are not easily available locally, the City will also accept international standards for RPZs from organisations such as the German Institute of Standardisation (Deutsches Institut für Normung – DIN) or the American Water Works Association (AWWA). Locally available RPZ models include the products manufactured by ARI and Caleffi. Ask your local supplier to indicate whether the RPZ is compliant with the SANS 1808-15 standard or an international equivalent. Also turn to the

illustrations in the installation checklists (sections 10 to 13), which show where RPZ valve back-flow preventers must be placed.

Installation of the RPZ valve must be done by a qualified plumber and conform to SANS 10252-1:2016 (Edition 3.1) which is the standard which applies. This is very important to check with your plumber, because many plumbers may be doing this for the first time and might not be informed about SANS 10252-1:2016 (Edition 3.1) requirements.

See the technical drawing/sketch showing how the RPZ should be installed in annexure 4. Some key installation features for the RPZ to note:

- Immediately downstream of the private stopcock, but installed on the customer's property inside the boundary wall (for reasons including security). The placement location of the RPZ is shown in the illustrations in sections 10-13.
- Must be installed above the ground and visible for inspection and maintenance. If it is below ground, even in a chamber or container, there is a greater risk of malfunction e.g. if submerged in water/liquid or any corrosive liquid or substance.
- Discharge or overflow from the RPZ can be into an open area (usually garden lawn or paving), so that it's visible and can be attended to, or into the sewer. If the discharge is going to be diverted into a piepline, it must go to the sewer and not into the stormwater system.

Periodic maintenance of the RPZ must be done by a qualified plumber, as per SANS 1808-15. The recommendation is for annual checks and maintenance.

The only alternative to an RPZ valve back-flow preventer is an air gap tank back-flow prevention method.

This method is for installations where large volumes of water are being used and there is a water storage tank involved. The water tank system becomes a 'break tank' when it incorporates an air gap in the tank to prevent water from backing into and contaminating the municipal water supply. The installation of a break tank should be as close as possible to the incoming municipal water mains supply on the property. The air gap is an unobstructed vertical distance (space) between the point where municipal drinking water enters the storage tank and the level at which the tank would overflow (tank water level), that prevents municipal water and alternative water from mixing. An acceptable air gap must be twice the size of the supply pipe diameter, but never less than 25 mm, measured vertically above the tank water level.

Refer to the detailed technical drawing which in annexure 3, which illustrates the City's standard for a contamination-proof tank with air gap which is permitted in lieu of RPZ back-flow preventer. This method is typically used in commercial or industrial business applications, larger developments or organisations and homes with large water tanks for storage capacity. (Most domestic homes are better suited for RPZ back-flow prevention.)

According to the Water By-law, the City has to approve the nature of back-flow prevention, which will require an inspection. Due to the significant risk involved, the City needs to check compliance with the Water By-law as well as the related SANS codes.

Discharge or generated waste from the installed system must be directed to the correct place.

Harmful chemicals or substances should not be allowed to enter the stormwater system. Instead, these should be directed to the sewer system so as to undergo treatment at the City's wastewater treatment works. However, the discharge of chemicals, toxins, pollutants or saline substances into the sewer should still be within the limits prescribed in the City's Wastewater and Industrial Effluent By-law. Please e-mail **water@capetown.gov.za** for guidance on such discharges and related regulatory processes. Also consult the illustrations in the installation checklists (sections 10 to 13), which show where discharge should be directed.

Safe disposal of sludge build-up in tanks.

Silt and sludge build-up in tanks needs to be cleaned out regularly, whether once a year or more often, depending on the volumes of water passing through the system. Scoop it out and use as little water as possible in the cleaning and rinsing process. Dispose of the silt and sludge as solid waste at municipal solid waste centres. Do not discharge it into the sewer.

All equipment such as plumbing hardware, pumps, tanks, etc. must be SABS-approved and installed as per the National Building Regulations.

6. REGISTRATION AND AUTHORISATION

6.1. Introduction to mandates for registration and authorisation

Water is both a scarce and shared resource, belonging to all South Africans. Current legislation provides for two responsible bodies for registration and authorisation of the installation and use of alternative water, with different yet complementary mandates. They are DWS and, in the case of Cape Town, the City (which is a water services authority as well as a Water Services Provider). For environmental impacts of alternative water systems, there is also regulation regarding environmental impacts which is the mandate of Department of Environmental Affairs and Development Planning (DEADP) of the Western Cape Government (WCG), as per the National Environmental Management Act 1998.

DWS is the custodian of our national water resources and has the primary responsibility for ensuring its equitable use and the prevention of health risks and possible environmental damage. The use of water resources, including groundwater, surface water and basement water is managed by the DWS. Small-scale reasonable household use, garden irrigation and watering of animals, as well as roof-top rainwater harvesting is permitted under Schedule 1 of the National Water Act 1998, updated September 2014. In some instances, a General Authorisation or a Water Use License is applicable depending on a range of factors. Approach DWS for more information. The amounts of water that may be abstracted, as well as other regulatory requirements, are subject to change and notified in the Government Gazette.

The City also has some mandated responsibilities for registration and approvals relating to alternative water use and installations. These mandates and their requirements are outlined below for each source of alternative water.

6.2. Summary of registration and authorisation requirements for use of alternative water

Water is a highly regulated resource in South Africa. This is to ensure its equitable use and to prevent possible health risks and environmental damage. Knowing where water resources and users are located and how much water is being used is key to managing the resource. For this reason, the use of groundwater, surface water and basement water has to be registered and authorised by DWS, being the statutory custodian of water resources. At the same time, registration and approvals are also required from the City in terms of groundwater drilling and use – on behalf of DWS – and all plumbing installations for alternative water systems. Environmental impacts of alternative water systems are also regulated by DEADP of WCG, and the City will provide guidance if it sees that the size and nature of the application will trigger the need for environmental authorisation from DEADP.

The following table summarises DWS and the City's registration and authorisation requirements for the source and use of alternative water. More details follow in section 6.3, where the requirements for each alternative water type are dealt with separately.

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	FROM NATIONAL DWS	FROM CITY OF CAPE TOWN
Rainwater	N/A	• Approval for installation
Groundwater	If beyond 'reasonable' domestic use as described in Schedule 1, then General Authorisation or Water Use Licence applies	• Registration of boreholes/wellpoints • Approval for installation
Basement water	If beyond use permitted by Schedule 1 use, then General Authorisation or Water Use Licence applies	• Approval for installation
Surface water	If beyond use permitted by Schedule 1 use, then General Authorisation or Water Use Licence applies	• Permission to abstract stormwater • Approval for installation
Greywater	N/A	• Approval for installation
Treated effluent – from City	Registration as a water user	• Approval for installation

6.3. Description of registration and authorisation requirements for use of alternative water

Rainwater and greywater

Rainwater and greywater systems do not require permission or licensing from DWS.

For City approval for the plumbing installation and use of this water, turn to section 6.6.

Groundwater

Groundwater has to be well regulated, monitored and managed so as to avoid over-abstraction and protect against any contamination risk to the municipal drinking water supply system and a negative impact on the environment. Groundwater refers to boreholes, wellpoints and springs. Since the use of groundwater is subject to the National Water Act 36 of 1998, consumers who wish to make use of groundwater resources need to apply and register for this use and obtain authorisation and/or licensing from DWS, as well as get approval from the City for the plumbing installation. The information below is as per the National Water Act (updated September 2014) and the City's Water By-law.

TO REGISTER AN EXISTING BOREHOLE OR WELLPOINT WITH THE CITY.

All consumers with an existing borehole or wellpoint on their property must register it with the City. Follow these steps:

Step 1: Send an e-mail to **water@capetown.gov.za** including:

- your full name and contact number;
- the address and erf number of the property;
- the location of the wellpoint or borehole on the property, including GPS coordinates if possible;
- the City water and rates account number for the property; and
- whether you are registering a wellpoint or borehole.

Step 2: Once you have registered, you will receive a free sign to display on your property. This sign will also include your unique registration number. Displaying this sign prominently (e.g. visibly at the entrance to the property) is a legal requirement to avoid being fined by water inspectors, especially during water restrictions. As the signs are produced through a tender process, it may take some time before you receive yours. In the interim, the auto reply you received when you e-mailed the City may be used as proof of your registration. You may also use your own signage until the official one from the City arrives.

For more/updated information, see **http://cct.gov.za/juF60.**

TO NOTIFY THE CITY OF THE INTENTION TO DRILL A NEW BOREHOLE OR WELLPOINT.

Notice should be given (or, according to the City's website, application made) 14 days prior to installation. After installation, the new borehole or wellpoint should then be registered. Follow these steps for notification:

Step 1: Download the application form to notify the City of your borehole/wellpoint from the City's website (**http://cct.gov.za/taUln**). This will help you familiarise yourself with the requirements and brief the contractor in preparation for the notification.

Step 2: Find a good contractor who can survey the site and provide all the correct information you need for your notification.

Step 3: Complete the application form and attach the following documents:

- a certified copy of your ID;
- proof of address; and
- a drainage layout plan showing the point of extraction.

Step 4: Submit your notification to e-mail **address water@capetown.gov.za** and the City will contact you. Remember, once installation has been completed, you will still need to register your borehole (see above).

Note that all groundwater installations must adhere to SANS 10299 Parts 1 to 9 for the maintenance and management of groundwater resources.

TO OBTAIN DWS AUTHORISATION.

The 'reasonable domestic use' of groundwater for household purposes, small-garden irrigation (not for commercial purposes) and animal watering (not for feedlots, and within the grazing capacity of the land) is permitted under schedule 1 to the National Water Act 1998, updated September 2014. No licence is required for this kind of so-called 'reasonable domestic use' of groundwater.

However, all commercial/business uses of groundwater are subject to authorisation/licensing by DWS. DWS will confirm registration under a General Authorisation (GA) which takes a few weeks, or they will issue a Water Use Licence (WUL) which takes much longer (up to 300 working days), depending on how much groundwater you require, along with other factors. To qualify for a GA, the user must comply with all the conditions listed in the relevant GA. For instance, one of the conditions of the GA for the Taking and Storing of Water (published 2 September 2016) limits the volume of water that may be abstracted per year.

For the application forms, see **http://www.dwaf.gov.za/Documents/Section21/eggeneric.pdf.**

For further information, contact DWS's regional office in Bellville on **customercare@dws.gov.za** or **021 941 6000/6353,** or visit their walk-in centre at **52 Voortrekker Road, Spectrum Building, Bellville.** Alternatively, try their national call centre on **0800 200 200.**

For City approval for the plumbing installation and use of this water, turn to section 6.6.

Basement water

REGISTER WITH DWS AS A COMMERCIAL/ INDUSTRIAL USER OF BASEMENT WATER, OR AN INDIVIDUAL WHO PLANS ON USING LARGE VOLUMES OF BASEMENT WATER.

This is required as per DWS's *Revision of General Authorisations in terms of Section 39 of the National Water Act, 1998 (Act 36 of 1998) of September 2013*. To register for the removal of basement water for reuse, for the storage of significant quantities of basement water and/or for the disposal of such water, obtain the relevant forms at **http://www.dwa.gov.za/Projects/WARMS/default.aspx.**

For further information, contact DWS's regional office in Bellville on **customercare@dws.gov.za** or **021 941 6000/6353**, or visit their walk-in centre at **52 Voortrekker Road, Spectrum Building, Bellville**. Alternatively, try their national call centre on **0800 200 200**.

Surface water

Surface water is subject to similar DWS authorisation and licensing requirements as groundwater (see 6.3.2 above), as DWS is the mandated custodian under the National Water Act. However, many surface water bodies also form part of the City's stormwater system, which implies that permission must also be obtained from the City to abstract from that system. Permission from the City will be granted based on factors such as the design of the abstraction pump/weir and the flood risk. If the volume to be abstracted is beyond what is permitted in Schedule 1, a General Authorisation or a Water Use Licence is required from DWS as well. For more information about City permission, email water@capetown.gov.za

TO OBTAIN DWS AUTHORISATION.

The 'reasonable domestic use' of surface water for household purposes and small-garden irrigation (not for commercial purposes) requires no authorisation under the National Water Act.

All commercial surface water uses, however, are subject to authorisation by DWS. The General Authorisation (GA) qualifications and conditions are stipulated in the DWS Revision of General Authorisation for the Taking and Storing of Water Notice 538 of 2 September 2016. These include maximum abstraction limits specified for drainage/ catchment areas across the country.

Factors that will determine the type of licence awarded are the quantity of water to be abstracted, its intended use, and the timeframe for which it is required. Although a licence is specific to a particular property, it does not preclude one property's surface water from being used on another property.

Note that depending on the impact on the surface water resource, the environment and other lawful water users, DWS may decline your application for water use authorisation. Also keep in mind that the regulatory requirements are constantly being updated, particularly so in the drought context. For example, the National Government Department of

Water and Sanitation recently gazetted a notice on limitations and related matters around borehole, wellpoint and surface water (rivers and streams), which took effect in January 2018.

For the application forms, see **www.dwa.gov.za/Projects/WARMS/contacts.aspx.**

For further information, contact DWS's regional office in Bellville on **customercare@dws.gov.za** or **021 941 6000/6353**, or visit their walk-in centre at **52 Voortrekker Road, Spectrum Building, Bellville**. Alternatively, try their national call centre on **0800 200 200**.

For City approval for the plumbing installation and use of this water, turn to section 6.6.

City's treated effluent

TO APPLY TO THE CITY TO BE CONNECTED TO THE TREATED-EFFLUENT PIPE NETWORK.

Step 1: Complete the Letter of Intent, which may be downloaded from **http://cct.gov.za/iNPx2**, and be sure to include information on:

- the amount of treated effluent you wish to use;
- your current drinking water usage; and
- the number of drinking water supply points.

Along with the completed Letter of Intent, you will need:

- a copy of your or the property owner's identity document;
- a copy of a recent municipal account displaying the property owner's personal details; and
- a clear site irrigation or plumbing plan of all water and sewer services, including the best possible point where the treated-effluent point should be installed (as outlined in the application form).

Step 2: Submit all these documents to **treated.effluent@capetown.gov.za**.

For City approval for the plumbing installation and use of this water, turn to section 6.6.

REGISTRATION WITH DWS AS A TREATED EFFLUENT WATER USER.

National DWS requires that those using the City's treated effluent as a water source be registered with them, if it is to be used for irrigation. When you apply to connect to the City's treated effluent supply, as per the above process, the City will automatically provide your details to DWS and they will contact you directly about how to register with them if required.

6.4. Storage of alternative water

Registration and authorisation requirements for storage of alternative water

On-site water storage is regulated under the *Revision of General Authorisation for the Taking and Storing of Water, Notice 538 of 2016* in Government Gazette No. 40243' and the *Revision of General Authorisations in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998)'*. To confirm the current permissible storage amounts, please contact DWS's regional office in Bellville on **customercare@dws.gov.za** or **021 941 6000/6353**, or visit their walk-in centre at 52 Voortrekker Road, Spectrum Building, Bellville. Alternatively, try their national call centre on **0800 200 200**.

Storage that exceeds the General Authorisation (GA) limits will require registration and may need a licence. DWS will confirm whether a licence is required once they have received the water user application and/or once the water use registration process has commenced.

The following table provides a synopsis of the registration and authorisation requirements for the storage of alternative water. Note, however, that it excludes any bulk storage applications and registrations that may be applicable under the Spatial Planning and Land Use Management Act 16 of 2013, the City's Municipal Planning By-law (2015) or the National Environmental Management Act 107 of 1998:

	FROM NATIONAL DWS	FROM CITYOF CAPE TOWN
Water (must not contain waste)	*Revision of General Authorisation for the Taking and Storing of Water in Terms of the National Water Act, 1998 (Act No. 36 of 1998); Notice 538 of 2016*	• Approval for storage tank installation
Rainwater	*Revision of General Authorisation for the Taking and Storing of Water in Terms of the National Water Act, 1998 (Act No. 36 of 1998); Notice 538 of 2016*	**Building compliance approval for:** • all storage tank installations with a capacity of more than 10 000 ℓ per single tank; or • tanks in excess of 1 000 ℓ manufactured/built on site using masonry, concrete, steel, etc.; or • all tanks on a supporting structure (of any material) of more than 1 m above the surrounding ground level; or • any tank installation where the City's building control officer is of the opinion that the nature of the installation and construction or manufacturing material of such tank will require authorisation. (Turn to page 35 for more details)
Surface water	*Revision of General Authorisation for the Taking and Storing of Water in Terms of the National Water Act, 1998 (Act No. 36 of 1998); Notice 538 of 2016.*	• Permission to abstract, store and use • Approval for storage tank installation
Basement water/domestic wastewater/ greywater[6]	*Revision of General Authorisations in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998), including: Section 3: "Disposing of waste in a manner which may detrimentally impact on a water resource"*	• Approval for storage tanks and installation

Building plan authorisation for some water tanks

The City's Building Control Officer regards water tanks as "minor building work" as referred to in section 13 of the National Building Regulations and Building Standards Act 103 of 1977. The following tanks require building plan authorisation from the City prior to installation:

- All tanks with a storage capacity of more than 10 000 ℓ per single tank
- All tanks in excess of 1 000 ℓ manufactured/ built on site by means of masonry, concrete, steel, etc. (those not supplied by a recognised manufacturer, or of a lesser functional standard than required for polyethylene storage tanks for water and chemicals in SANS 1731:2017 Edition 1)
- All tanks on a supporting structure (of any material) more than 1 m above the surrounding ground level
- Any tank installation where the City's Building Control Officer believes that the nature of the installation and construction or manufacturing material of such tank will require authorisation

In the cases listed above, a normal building plan submission under the "minor building work" category must be made to your nearest City district planning office. Your planning office may also be consulted for clarity on whether you need to submit an application. Contact details for all district planning offices appear on the City's website.

[6] The *Revision of General Authorisations in terms of Section 39 of the National Water Act, 1998 (Act 36 of 1998)* defines domestic wastewater as wastewater arising from domestic and commercial activities and premises, and may contain sewage.

Once your application has been submitted, the City's Building Control Officer (or a representative) will evaluate the stability of your tank installation. Where necessary, you will also need to appoint a competent person to assist you with the authorisation required for water tanks or supporting structures exceeding 1 m in height.

Whenever the City believes that a water tank installation that requires authorisation is dangerous or showing signs of becoming dangerous, the Building Inspector must serve on the property owner a notice to rectify. If the property owner fails to comply, the prescribed enforcement process will be triggered.

6.5. Discharge or disposal of alternative water

Any alternative water that is used or that overflows needs to be discharged to the correct place. Consult the paragraphs below as well as the illustrations in the installation sections (sections 10 to 13) for information on how to discharge alternative water correctly.

Discharge into stormwater system

Local government is responsible for stormwater management systems in terms of the Constitution. Cape Town's stormwater management systems are guided by the City's By-law Relating to Stormwater Management (2005), the Management of Urban Stormwater Impacts Policy (2009) and the Floodplain and River Corridor Management Policy (2009). These documents stipulate the following:

- **Only stormwater** may be discharged into the stormwater system.
- **Polluted water** such as swimming pool backwash, greywater or sewage may not to be discharged into the stormwater system, unless prior written permission (except for sewage) has been obtained from the Catchment, Stormwater and River Management Branch of the City's Water and Sanitation Department. Instead, such water containing harmful chemicals or substances should be directed to the sewer system so that it can be treated at the City's wastewater treatment works.

There is a very important reason for these stipulations. Stormwater from the stormwater system is typically discharged into a river, wetland or the sea – all natural systems with ecologies sensitive to any potential pollutants. In addition, the stormwater system is designed to accommodate particular flows and volumes so as to prevent environmental damage and flooding. For this reason, it is also best practice to first direct rainwater overflow from rainwater tanks to planted areas, and only then direct any surplus to the stormwater system.

For queries on discharging alternative water into the stormwater system, e-mail **waterpollution.control@capetown.gov.za**.

Discharge into sewer (wastewater) system

The sewer (wastewater) system transports sewage, greywater and industrial waste. In terms of discharge into the wastewater system (the sewer), therefore, the following must be adhered to:

- The backwash of a **chlorinated swimming pool** must be discharged into the wastewater system.
- The backwash of a **salt-water pool** or a pool that has been topped up with seawater must similarly also be discharged into the wastewater system.
- **Greywater tank overflow** must be directed to the wastewater system.
- The discharge of **chemicals, toxins, pollutants or saline substances** (including brine produced through processes such as Nano filtration or reverse osmosis treatment) should at all times be within the limits prescribed in the City's Wastewater and Industrial Effluent By-law. This applies to any type of consumer, whether smaller-scale residential or larger commercial and industrial users. Also keep in in mind that, as a standard rule, City permission is required for **any industrial effluent** discharged into the sewer.
- The discharge of **basement water** into the sewage network is **not permitted**, unless the City's prior written consent is obtained.
- **Groundwater overflow, gutter downpipe or rainwater** tank overflow pipe may **not** be connected to the wastewater system, but should be directed to the stormwater system.

As with discharge into the stormwater system, there are sound reasons for managing alternative water discharge into the wastewater system too. The wastewater system transports sewage, greywater and industrial waste. The reticulation network that collects wastewater discharges into wastewater treatment works, or in some cases, directly into the sea. Wastewater treatment works are important because they improve the quality of wastewater for reuse as treated effluent, aquifer recharge or sometimes for domestic purposes, including drinking water. Because the treatment processes are sensitive and can accommodate only a particular load, the quality and quantity of the wastewater must be carefully managed to prevent damage/malfunction to the wastewater treatment works.

Applications with regard to the discharge of alternative water into the City's sewer system will be handled on a case-by-case basis, considering factors such as:

- the source and nature of the wastewater;
- whether disposal will be going to a marine outfall, sewer, solid waste landfill or hazardous waste disposal site; and
- whether the sewer network in that area can accommodate increased flow.

Overflow

Sometimes there may be excess alternative water that overflows e.g. in the event that there is excess water in storage tanks. The quality of alternative water sources varies considerably, and so the overflow must be directed to the right place. Overflows from tanks containing untreated rainwater should go to stormwater. If the rainwater has been treated with chemicals (e.g. chorine) it should go to sewer. Storage tanks for other forms of alternative water should overflow to sewer.

6.6. City approval for plumbing installation and use

In terms of the City's Water By-law (amended in 2018), property owners generally need to apply to the City for approval before any alternative water system is plumbed into their properties. However, if the system is already installed, the City's retrospective approval should be sought. The process for obtaining approval is as follows:

Step 1: Download the application form for the installation and use of alternative water from the City's website at **http://cct.gov.za/bC2nV**. Those without internet access may get and submit the necessary documents at their nearest City walk-in centre. Call **0860 103 089** for any assistance. The three-page form must be completed personally by the property owner, and not by a third-party service provider, unless formal proxy or power of attorney has been arranged.

Attach the following to the form:

FOR SYSTEMS INTENDED FOR IRRIGATION AND EXTERNAL USE ONLY:

- Compulsory schematic drawing of intended installation
- Permission or licence from DWS, where required, such as for groundwater or surface water

FOR SYSTEMS PLUMBED INTO THE BUILDING FOR INTERNAL USE:

- Copy of most recent municipal account for the property (rates, water and sewage bill)
- Compulsory schematic drawing of intended installation, showing location of RPZ valve back-flow preventer
- Certificate of Approval from qualified plumber if the system is already installed
- Water quality test analysis, if that has been done
- Permission or licence from DWS, where required, such as for groundwater or surface water

Step 2: E-mail the completed form and supporting documents to **water@capetown.gov.za**.

Step 3: The City will review your application and supporting documents, after which a City Water Inspector will conduct an inspection to verify that the installation complies with regulations.

Note that if the installation is ever changed in future, further approval for the altered installation will be required. This includes cases where alternative water initially used for irrigation only is plumbed into the building at a later stage.

7. LABELLING AND COLOUR-CODING FOR PIPES

It is standard practice around the world to colour-code and label pipes and related plumbing materials so as to easily identify which pipes contain or transport which type of fluid or raw material.

This is especially important for alternative water, which must be kept completely separate from the drinking water supply because of the potential hazards and contamination risk associated with it.

Although colour-coding and labelling is typically seen more in industrial and commercial buildings, it is equally useful in homes, particularly where schematic drawings are not available. Current or future owners, and anyone working on the pipes in the building, need to be aware of what's inside the pipes.

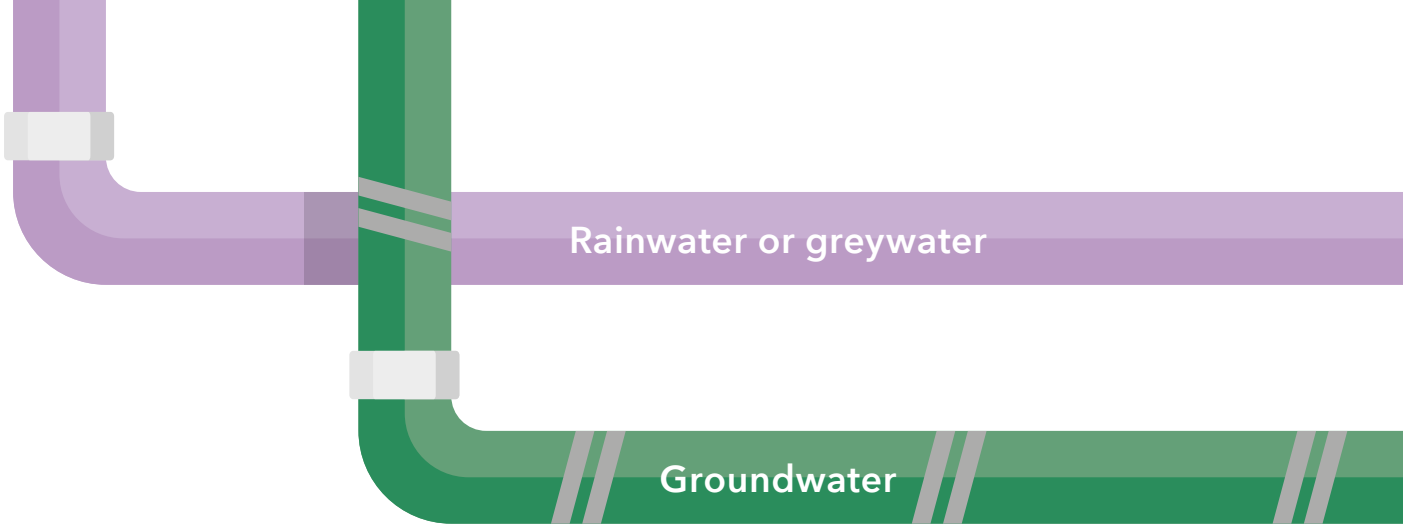
Colour-coding and labelling varies from one place to the next, and there is no common international standard. While South Africa has some standards in this regard – such as SANS 10140-3:2003 for the identification of colour markings, and SANS 1091:2012 for national colour standard – they do not cover everything that is required for the broad range of alternative water types in Cape Town, and the SABS is therefore currently reviewing them. In the interim, the City has decided on the following, after consideration of a range of factors:

7.1. Colours for different types of alternative water

- **Rainwater or greywater – lilac.** Municipalities in many countries (e.g. Australia, United States and Canada) use lilac to denote alternative water in end-consumer plumbing installations and reticulation networks. The Pantone colour code 522 or the RAL standard 4006 is the closest reference for this lilac colour.

- **Groundwater – green with two grey stripes.** This is the colour code approved by SABS for groundwater a few years ago. The green colour is called 'brilliant green', and the Pantone code is 364C or the RAL standard 6002. For the grey strips, Telegrey2 – RAL 7046 is a close reference colour. Pipes leading to the storage tank must be green with two grey stripes. Pipes leading from the storage tank to the point of use must be lilac (Pantone 522, as above).

- **Treated effluent from the City – orange.** Orange is the international colour for gas. In South Africa, however, a few cities, including Cape Town, have adopted orange for all reticulation piping carrying treated effluent to end users. (It's not clear why this decision was made originally.) Pipes carrying treated effluent must be the colour orange or be painted orange to distinguish them from pipes carrying drinking water. This would also apply to effluent treated for reuse on the site, with the required legal consent. If the treated effluent is stored in a tank, the pipes going from the tank to the point of use should be lilac (as above).



These colours are not reflected in the current SANS standards, and piping manufactured in these colours may not be easily available in the marketplace yet. In time, however, this is likely to change.

If the pipe is available for purchase in the designated colour (i.e. the pipe is manufactured with the required colour in the resin of the pipe), that would be ideal. This applies to Unplasticized Polyvinyl Chloride (Upvc) and High Density Polyethylene (HDPE) materials for water storage tanks and Polyvinyl Chloride (PVC) for pipes. There are some local manufacturers which can provide any colour, however the City cannot and does not endorse any particular supplier. Pipes provided in special colours should comply with current and future SANS standards.

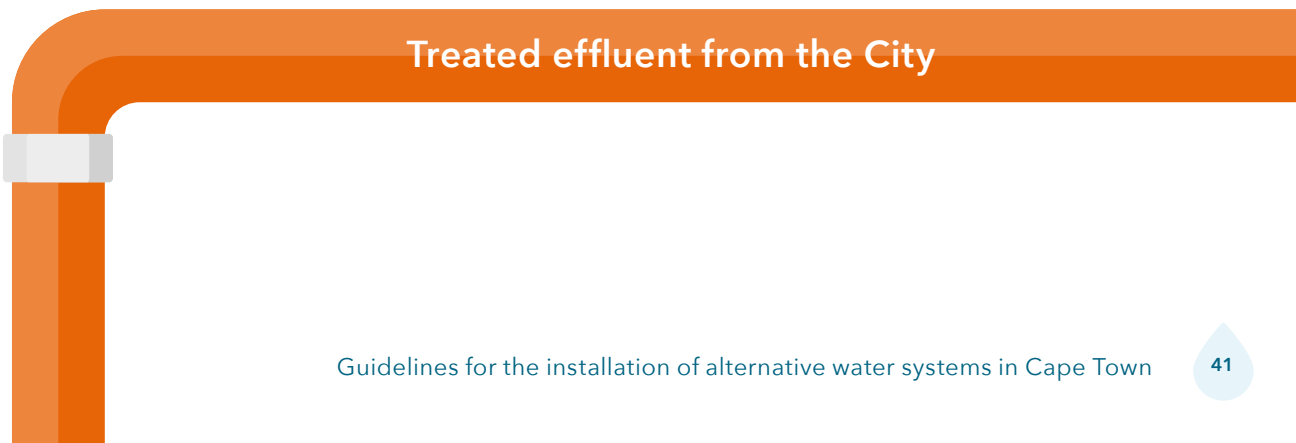
At this stage, of 'industry readiness' it is permissible to paint at least a small strip of the colour onto the relevant pipes and/or label the alternative pipes well. Where pipes are exposed to the sun, they should be painted every two years or whenever necessary, as they do tend to fade.

7.2. Where and how to label or colour-code

The objective with labelling and colour-coding is to clearly indicate which pipes contain potentially risky alternative water, and which contain safe drinking water. Yet the pipe does not have to be in the designated colour across its entire length if this would create aesthetic issues (particularly in homes). According to SANS 10140, pipes may be colour-coded in small sections instead of across the whole length and/or may simply be clearly labelled.

Pipes leading from the source of alternative water to the storage tank, and from a storage tank to the point of use, should definitely be labelled and preferably also be in the designated colour (see above). Valves and taps which are part of the installation, and the pipes inside the walls should also be labelled as a minimum, and in the designated colour where possible.

Schematic, 'as-built' drawings should also be produced and stored safely for future use by the current and future owners and occupants of the property, as well as those who need to work on the installation, such as plumbers.



8. SIGNAGE

Signage indicating that alternative, non-drinking water is being used on the property must be prominently displayed to warn about the dangers of consuming or coming into contact with such water.

This signage must be clearly displayed at all times in the main thoroughfare or entrance to the property, as well as at any extraction/ outlet points, such as taps or irrigation systems. See the illustrations in section 10 which give an indication of where signage should be situated and where to obtain it.

It must comply with national standard SANS1186-1:2015 for signage of this nature, and with section 61 of the City's Water By-law.

Download and print the City's non-drinking water sign from **www.capetown.gov.za/thinkwater**.

It should be printed large enough to ensure visibility (at least A4 or A3 size) and preferably in colour. Laminate it to be weather-proof for as long as possible, and use cable ties or other means to secure it. The official signage contains all three official languages of the Western Cape, namely English, Afrikaans and Xhosa.

9. WHAT TO LOOK FOR IN AN INSTALLER

Certain companies in Cape Town design and install alternative water supply systems as their main business focus. Some have been doing it for a while and have become experts in their field. However, given the demand generated by the drought crisis, there are likely to be many new entrants to the market too. Currently, there is no formal, accredited training in the installation of alternative water systems, although plumbing industry associations are working on it. In the meantime, a qualified plumber should be able to install an alternative water system using these guidelines and illustrations.

To help reduce the risk of a poor or illegal installation, use this checklist:

Registration and qualifications.

Ensure that the installation will be done by a qualified plumber who is registered with the City. See the City's register of qualified plumbers at **www.capetown.gov.za/thinkwater**.

Previous experience/performance.

Determine whether the installer or plumber has a proven track record with the kind of system you require. Ask for references with contact details. Ask previous customers whether they experienced the plumber as competent and sufficiently skilled. Ask the plumber about the pros and cons of the systems (s)he supplies/installs, especially for your context or needs. This will indicate his/her understanding of what you need in an alternative water system.

Adherence to standards and By-laws.

Ask the installer about the SANS standards, national legislation and by-laws relating to the alternative water system(s) being considered, and whether (s)he adheres to them. Also see section 2, "Legislative overview and alignment", as well as the installation checklists on the following page for the standards or by-laws applicable/required for each type of alternative water system. Check that the installer understands the key principles, such as the need to install a RPZ valve back-flow preventer to avoid the contaminationof the municipal drinking water supply.

10. CHECKLIST FOR INSTALLING GREYWATER SYSTEMS

10.1. Pre-installation

Choosing the right greywater system for your needs.

The greywater system should be designed with your unique water use and reuse needs, property layout and size as well as plumbing system configuration in mind. Systems for outdoor use alone – primarily for garden irrigation – tend to operate on filtered yet untreated greywater that is used within 24 hours, either through gravity feed or flowing to a collection tank and then being pumped into the garden (see Annexure 1 for important conditions for the use of greywater in non-food and food gardens). If the greywater is stored for longer than 24 hours without any treatment (e.g. if you go away for a few days), it must be flushed down the sewer.

Beware of cleaning agents contained in greywater. High levels of phosphates in detergents increase the nutrient load on the system and may over time cause the quality of soils to deteriorate. Fabric softeners and bleaches that contain sodium hypochlorite and anionic surfactants also negatively affect the microbiological processes used for treating wastewater, and must be avoided.

Untreated greywater is not recommended for toilet flushing, as it causes storage tanks/cisterns to build up sludge, which will require frequent maintenance. If untreated greywater is used, it needs to be directed straight into the toilet for flushing, and not through a cistern/storage tank, and must be used within 24 hours.

It is highly recommended that all greywater be filtered and treated, although this is likely to be more complex and expensive. Minimum treatment would include filtration and in-line chlorinators or chlorine dissolving tablets. Consult the matrix in section 4.2 for the recommended water quality for the various uses, and seek specialist/expert advice on any treatment required, especially if greywater is to be stored for longer than 24 hours.

Contact an experienced greywater system installer or plumber.

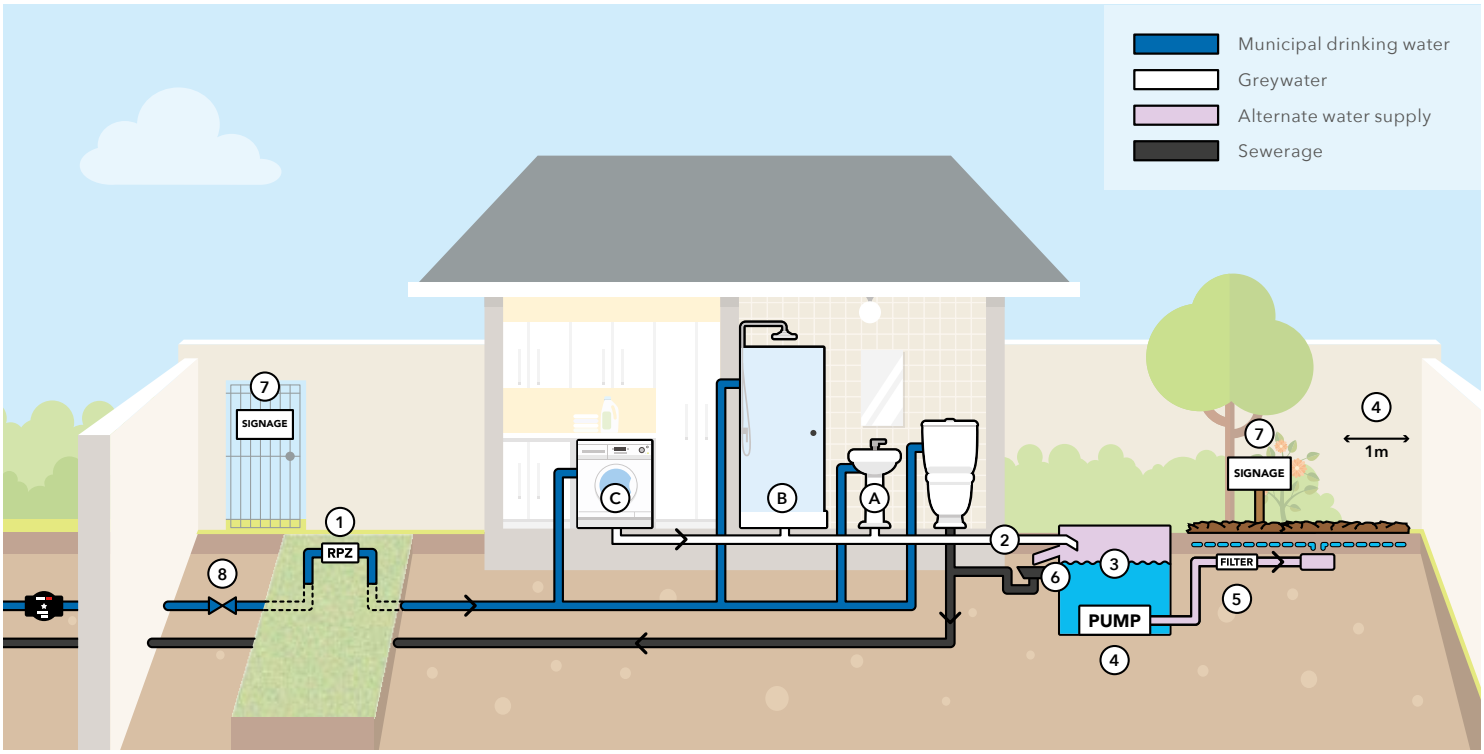
If you are not knowledgeable enough about greywater systems to select one on your own, rather contact an experienced greywater system installer or registered plumber. They should be able to help you determine the appropriate storage tank size for your needs based on your household size, water demand and garden size.

Submit an application to the City for the installation of an alternative water system (see section 6.3).

Submit a building plan to the City for the authorisation of a water tank, where applicable (see section 6.4).

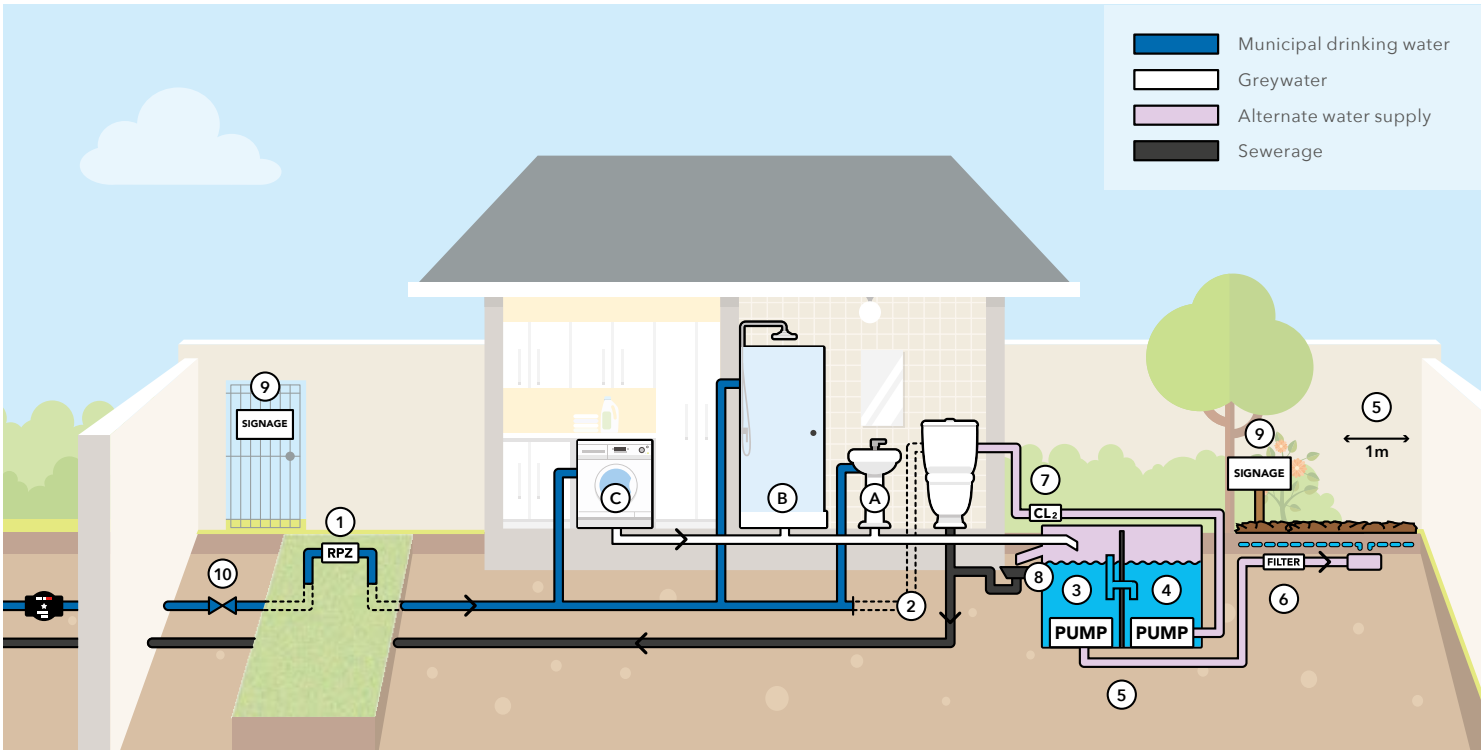
10.2. Installation

The two main uses of greywater – irrigation and toilet flushing – are illustrated on pages 43 and 44. All the principles and requirements contained in the illustrations and the numbered explanatory notes are in line with the City's Water By-law and current policy context for the lawful use of greywater installations.



Greywater system for outdoor use: irrigation and vehicle cleaning

1. Municipal drinking water supply into property fitted with a RPZ valve back-flow preventer. Currently not mandatory for systems where the alternative water source is solely used for irrigation purposes. But strongly recommended as best practice, since many property owners might want to plumb their greywater systems into their homes for indoor use in the future, in which case an RPZ would be essential to avoid possible contamination. If installed, the RPZ must be placed immediately downstream of the private stopcock inside the property boundary, above ground, and according to SANS 10252-1:2016 (Edition 3.1). See the technical drawing/sketch guidance in annexure 4.
2. Greywater sources connected to storage tank. The inclusion of greywater sources A, B and/or C depends on irrigation needs.
3. Collection and treatment of greywater in storage tank. Tank installation must comply with national building regulations, SANS 2001-CC2 if you're constructing a concrete base, and the manufacturer's specifications. Disinfection of the storage tank must comply with SANS 10252:1 (as amended). Greywater must be used within 24 hours. Ensure that the storage tank is empty when going away for longer than 24 hours.
4. Any underground tank installation must be at least 1 m away from the boundary wall and must comply with national building regulations.
5. Filtered greywater for drip/subsurface irrigation under a thick layer of mulch. Greywater should not be sprayed because of health reasons and to reduce evaporation.
6. Storage tank overflow to sewer.
7. Official, weather-proofed signage to be placed in main thoroughfare (entrance) and at points of use to warn people against using the greywater for drinking, cooking or ablution. If the installation includes a tap that people may be tempted to drink from, use or waste, preferably lock it or turn it into a 'demand' tap.
8. Install a private stopcock after the boundary wall and before the RPZ valve back-flow preventer.



Greywater system for outdoor use and toilet flushing

1. Municipal drinking water supply into property fitted with a RPZ valve back-flow preventer (mandatory). The RPZ must be installed immediately downstream of the private stopcock inside the property boundary, above ground, and according to SANS 10252-1:2016 (Edition 3.1). See the technical drawing/sketch guidance in annexure 4.
2. Municipal water supply to cistern must be disconnected.
3. Collection, settlement and filtration of greywater in storage tank(s). All tank installations must comply with national building regulations, SANS 2001-CC2 if you're constructing a concrete base, and the manufacturer's specifications. Greywater must be used within 24 hours. Ensure that the storage tank is empty when going away for longer than 24 hours.
4. Collection, disinfection and distribution of greywater in second part of the storage tank.
5. Any underground tank installation must be at least 1 m away from the boundary wall and must comply with national building regulations.
6. Screen-filtered greywater for drip/subsurface irrigation under a thick layer of mulch. Greywater should not be sprayed because of health reasons and to reduce evaporation.
7. Filtered and disinfected greywater for toilet flushing, using an in-line chlorinator (or equivalent).
8. Storage tank overflow to sewer.
9. Official, weather-proofed signage to be placed in main thoroughfare (entrance) and at points of use to warn people against using the greywater for drinking, cooking or ablution. If the installation includes a tap that people may be tempted to drink from, use or waste, preferably lock it or turn it into a 'demand' tap.
10. Install a private stopcock after the boundary wall and before the RPZ valve back-flow preventer.

Additional guidelines

- Ensure that the appropriate colour-coding for alternative water pipes is used (see section 7).
- Ensure that the official signage for the use of alternative water systems is displayed on your property (see section 8).
- Use a filter and/or screen in your system to remove various solid materials before they enter the collection tank.
- Ensure that tank access openings are properly covered and that the tank location allows sufficient space for inspection and maintenance. Also install your storage tank in a shady space to keep out direct sunlight. In this respect, underground tanks are ideal and do save space, although aboveground tanks are cheaper and more accessible. Any subsurface tanks must be installed at least 1 m away from the property boundary line/wall.
- Any greywater stored for longer than 24 hours requires treatment.
- For food gardens, reduce contact with aboveground edible plants by using drip irrigation under a thick layer of mulch (at least 10 cm). Clean nozzles frequently to prevent them from clogging up.
- Greywater irrigation is not recommended in areas with a high water table, as it may contaminate the groundwater. Check your water table level before installing a greywater irrigation system.
- A cover or pump house (similar to that of a pool pump) must be placed over the pump to protect it from the sun, rain, wind and adverse weather conditions.

10.3. Post-installation

Signage indicating use of non-drinking water must be displayed at all times (see section 8).

Regular maintenance to ensure optimum operation as well as good health and safety.

The property owner/resident should undertake weekly system checks, cleaning and maintenance. Filters must be cleaned weekly or according to the manufacturer's specifications. The irrigation system must be inspected regularly. If a collection tank is installed, it must be visually inspected weekly, and periodic de-sludging should be conducted by removing sediments and cleaning. Brush filters may be cleaned with biodegradable household cleaning products available in major retail stores. However, be sure to rinse the filters before putting them back so that further bio-enzymes or other chemicals that could potentially worsen the quality of the water are not introduced into the greywater system.

Tanks should be regularly disinfected, in compliance with SANS 10252:1 (as amended).

Also check with your plumber on the maintenance plan for your alternative water system, for example in terms of filter replacement. Adhere to this plan to ensure that your water is being treated to the appropriate standard.

11. CHECKLIST FOR RAINWATER HARVESTING SYSTEMS

11.1. Pre-installation

Determine the rainwater harvesting potential for your property.

The rainwater harvesting potential of your property will be determined by the rainfall in your local area as well as your roofing material. Metal roofs are the most efficient rainwater harvesters, with tiled roofs coming in second. This is backed up by statistics: While 11 mm of rainfall on a metal roof can produce 1 000 ℓ of harvested rainwater for every 100 m^2 of roof area, it will take 16 mm of rainfall to produce the same quantity of harvested rainwater for every 100 m^2 of tiled roof area. Thatched roofs are the least efficient rainwater collectors. The Climate Systems Analysis Group website, **http://cip.csag.uct.ac.za/webclient2/waterharvest/**, contains a useful rainwater harvesting tool. Simply follow the steps and determine your rainwater harvesting potential.

Choosing the right rainwater system for your needs.

In essence, rainwater harvesting is the collection of rainwater from the roof and gutters, from where it is directed to a downpipe and into a tank. Harvested rainwater can be stored in containers or tanks of various sizes, or be fed into larger reservoirs that are typically underground. It can also feed directly to the garden or into swimming pools via plastic sleeves or pipes. The system should be designed for your specific context, depending on factors such as the rainfall patterns in your area, your roof type, gutter systems, property size and water use needs.

Distribution may occur via gravity or a pump, but will depend on the intended use of the water, as well as the location of the tank. Treatment will also depend on the use of the rainwater. See the recommended water quality for various uses in the matrix in section 4.2.

Contact a rainwater system installer or plumber.

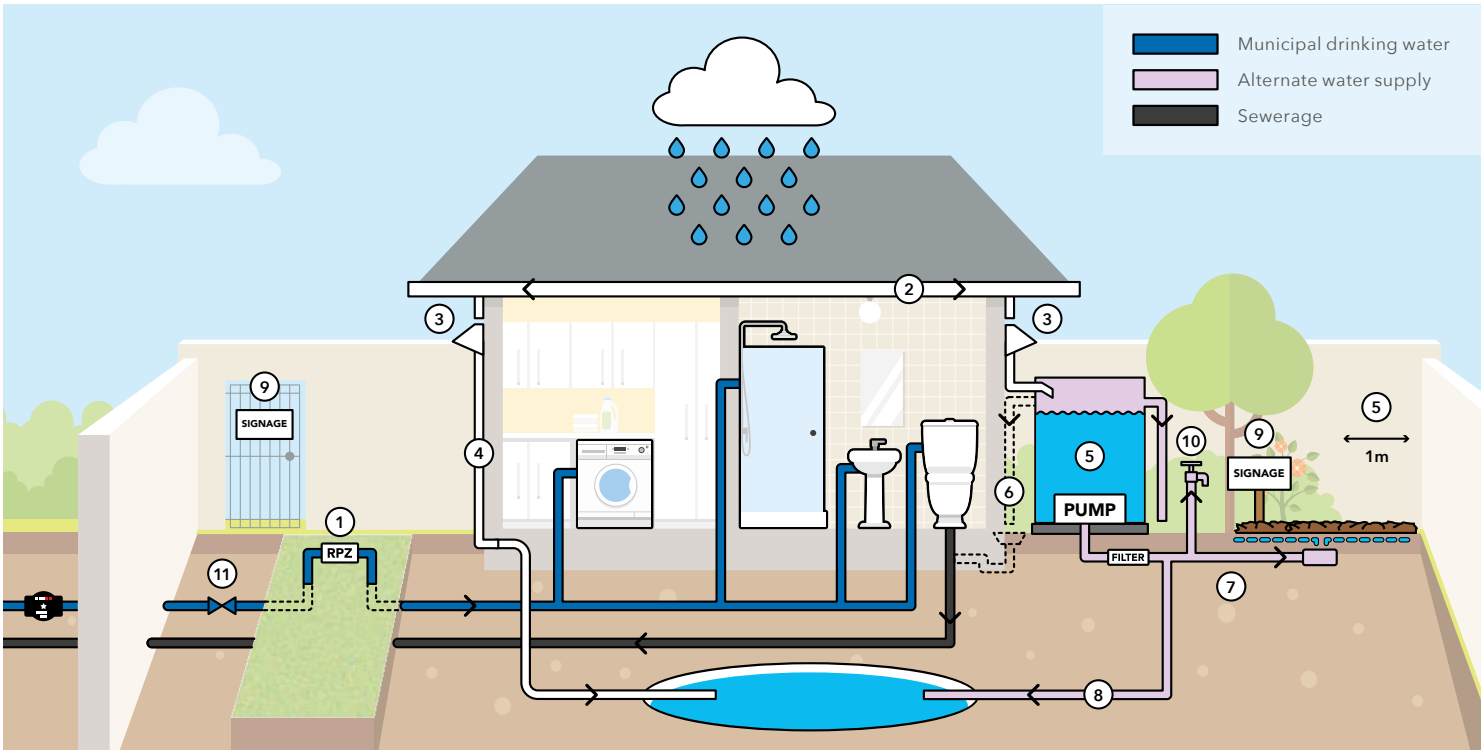
If you are not qualified or knowledgeable enough about rainwater harvesting systems to select one on your own, rather contact an experienced rainwater system installer and/or a registered plumber to provide the advice and services you need.

Submit an application to the City for the installation of an alternative water system (see section 6.3).

Submit a building plan to the City for the authorisation of a water tank, where applicable (see section 6.4).

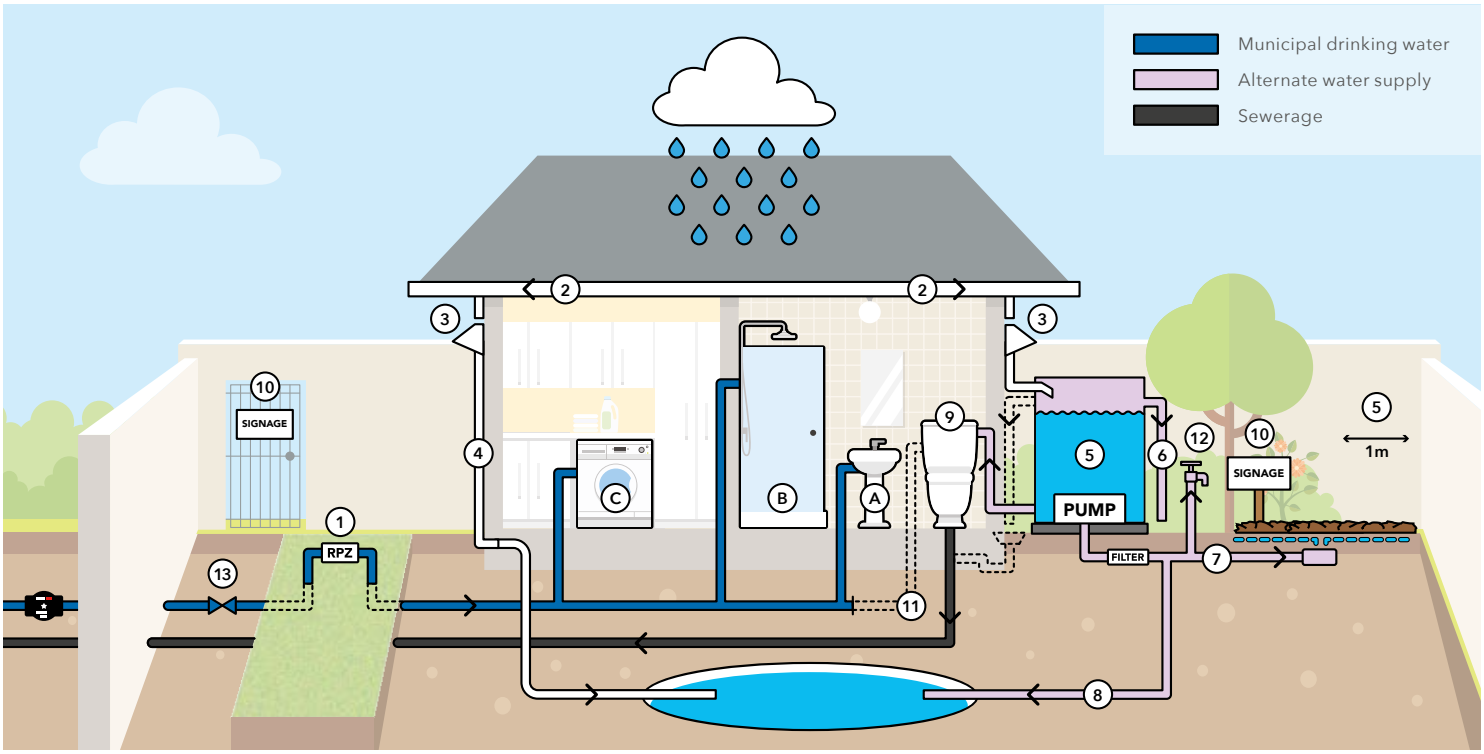
11.2. Installation

The two main uses of rainwater – outdoor use (including garden irrigation, vehicle and hard-surface cleaning) and toilet flushing – are illustrated on pages 49 and 50. All the principles and requirements contained in the illustrations and the numbered explanatory notes are in line with the City's Water By-law and current policy context for the lawful use of rainwater harvesting.



Rainwater system for outdoor use: irrigation, vehicle & hard surface cleaning

1. Municipal drinking water supply into property fitted with a RPZ valve back-flow preventer. Currently not mandatory for systems where the alternative water source is solely used for irrigation purposes. But strongly recommended as best practice, since many property owners would want to plumb their rainwater systems into their homes for indoor use in future, in which case an RPZ would be essential to avoid possible contamination. If installed, the RPZ must be placed immediately downstream of the private stopcock inside the property boundary, above ground, and according to SANS 10252-1:2016 (Edition 3.1). See the technical drawing/sketch guidance in annexure 4.
2. Rainwater channelled to storage tank via gutters.
3. Debris diverted by sloped screen.
4. Rainwater for topping up pool or other outdoor use, in this instance directly from gutters using gravity feed, for example via a flexible plastic sleeve (the other option being a tank).
5. Collection of rainwater in storage tank. Tank installations may be below or above ground and may be elevated if placed on a strong enough base (e.g. concrete). Comply with SANS 10252-1:2016 (Edition3.1) for water storage tanks, SANS 2001-CC2 if you're constructing a concrete base, the National Building Regulations and Building Standards Act 103 of 1977, as well as the manufacturer's specifications. Any underground (subsurface) tank installation must also be at least 1 m away from the boundary wall.
6. Storage tank overflow to stormwater. If rainwater is treated with any chemicals, the overflow must be discharged into the sewer.
7. Rainwater for drip/subsurface irrigation under a thick layer of mulch, vehicle washing and/or hard-surface cleaning.
8. Rainwater for topping up pool. Pool cover as per requirements of water restrictions.
9. Official, weather-proofed signage to be placed in main thoroughfare (entrance) and at points of use to warn people against using the rainwater for drinking, cooking or ablution.
10. If the installation includes a tap that people may be tempted to drink from, use or waste, preferably lock it or turn it into a 'demand' tap.
11. Install a private stopcock after the boundary wall and before the RPZ valve back-flow preventer.



Rainwater for outdoor use and toilet flushing

1. Municipal drinking water supply into property fitted with a RPZ valve back-flow preventer (mandatory). The RPZ must be installed immediately downstream of the private stopcock inside the property boundary, above ground, and according to SANS 10252-1:2016 (Edition 3.1). See the technical drawing/sketch guidance in annexure 4.
2. Rainwater channelled to storage tank via gutters.
3. Debris diverted by sloped screen.
4. Rainwater for topping up pool or other outdoor use, in this instance directly from gutters using gravity feed, for example via flexible plastic sleeve.
5. Collection of rainwater in storage tank. Tank installations may be below or above ground and may be elevated if placed on a strong enough base (e.g. concrete). Consider SANS 10252-1:2016 (Edition3.1) for water storage tanks, SANS 2001-CC2 if you're constructing a concrete base, the National Building Regulations and Building Standards Act 103 of 1977, as well as the manufacturer's specifications. Any underground (subsurface) tank installation must also be at least 1 m away from the boundary wall.
6. Storage tank overflow to stormwater. If rainwater is treated with any chemicals, the overflow must be discharged into the sewer.
7. Rainwater for drip/subsurface irrigation under a thick layer of mulch, vehicle washing and/or hard-surface cleaning.
8. Rainwater for topping up pool. Pool cover as per water restrictions in place at the time.
9. Rainwater for toilet flushing.
10. Official, weather-proof signage to be placed in main thoroughfare (entrance) and at points of use to warn people against using the rainwater for drinking, cooking and ablution.
11. Municipal water supply to cistern must be disconnected when rainwater is used. This may be seasonally disconnected during winter rainfall months, or permanently if there is sufficient storage.
12. If the installation includes a tap that people may be tempted to drink from, use or waste, preferably lock it or turn it into a 'demand' tap.
13. Install a private stopcock after the boundary wall and before the RPZ valve back-flow preventer.

Additional guidelines

- Ensure that the appropriate colour-coding for alternative water pipes is used (see section 7).
- Ensure that the official signage for the use of alternative systems is displayed on your property (see section 8).
- The plumber/installer will select appropriately sized gutters, downpipes and drainage piping. Where possible, gutters must slope to the rainwater tank to maximise efficiency and minimise water loss.
- The installation of a first-flush diverter is optional. This acts as a contamination barrier that diverts initial surface runoff from the first rainstorms of a season – along with the possible contaminants it carries – away from the tank. The first-flush diverter must be empty when rainfall starts, and should be inspected frequently. However, many experienced installers report that first-flush diverters waste a lot of water and are unnecessary if a good screen or filter is installed at the inlet or inside the tank. If no first-flush diverter is installed, a screen or filter must be used. This is to prevent large particles (such as leaves and debris) from entering the tank, and to sift out the smaller solids before water is piped to its end use. Although the general micron size for a screen/ filter is 800 microns (0,8 mm), it is best practice to use a screen/ filter of 200 microns (0,2 mm) to prevent very fine particles from entering the tank.
- Overflow must discharge into the stormwater system.
- Ensure that tank access openings are properly covered and that the tank location allows sufficient space for inspection and maintenance. Also install your storage tank in a shady space to keep out direct sunlight. Follow the manufacturer's recommendations, which may also include the need for levelling and compacting the ground on which the tank is to be placed, or the provision of a concrete plinth to carry the heavy load of the water.
- Underground tanks save space, but aboveground tanks are cheaper and more accessible. Any subsurface tanks must be installed at least 1 m away from the property boundary line/wall and will require a pump for distribution.

11.3. Post-installation

Signage indicating use of non-drinking water must be displayed at all times (see section 8).

Regular maintenance to ensure optimum functionality and avoid health risks.

Weekly system checks must be undertaken. Filters must be cleaned weekly or according to the manufacturer's specifications. Irrigation systems must be inspected regularly. If a storage tank is installed, it must be visually inspected weekly, and periodic de-sludging should be conducted. Gutters should be cleaned regularly to keep them free of debris, such as leaf litters and bird faeces. If inspection reveals a high build-up of solids in the tank, flush to the stormwater system or use for irrigation, if appropriate. Regular disinfection of the storage tank(s) must comply with SANS 10252:1 (as amended).

12. CHECKLIST FOR GROUNDWATER SYSTEMS

12.1. Pre-installation

Choosing the right system for your needs.

To create a wellpoint, a high-pressure jet is used to pump water through a steel pipe, pushing it down into the ground. A perforated pipe is placed inside the steel pipe, and the steel pipe is removed. Wellpoints may consist of multiple holes connected to the common suction pipe just below ground level. Wellpoints are smaller, shallower and more economical installations than boreholes and take approximately two to four hours to install. These are suitable for small to medium gardens, in sedimentary sand conditions, and where the groundwater table is relatively close to the surface (not deeper than 10 m if the pump is surface-mounted).

A borehole, on the other hand, is usually a single, larger-diameter hole (100 mm to 250 mm) drilled into the ground at a depth ranging between 15 m and 130 m. Boreholes are drilled by an auger, which sinks a cylindrical hole vertically into the ground through all geological layers, including hard rock and granite, which of course makes it significantly more expensive. Boreholes cost roughly R1 000 for every metre in depth, depending on the depth and extent of hard rock conditions. Installation takes approximately three to five days. The drilling procedure generates excess material that needs to be used elsewhere or be disposed of at a landfill site.

All groundwater installations will vary depending on factors such as your property's location, geology, soil conditions, depth to groundwater, and the nature of your water needs. Springs do not require deep drilling, but will require pumping.

Request a geo-hydrologist, installer or related specialist to assess the property.

They will help determine whether groundwater is present and feasibly available to be drawn from, and whether a wellpoint or borehole will be best. To this end, they will consider the soil conditions and underlying geology, as well as whether wellpoints or boreholes are predominantly being used at other properties in the area.

Estimate the volume of groundwater to be abstracted, and test its quality.

Estimate the total volume of groundwater to be withdrawn every day judging by the type of lawn, trees, plants and crops to be irrigated and/or the scope of indoor use. A water sample must also be taken for testing to determine whether the groundwater has a high iron content and whether the water quality is sufficient for the intended purpose.

Get quotes and appoint a driller.

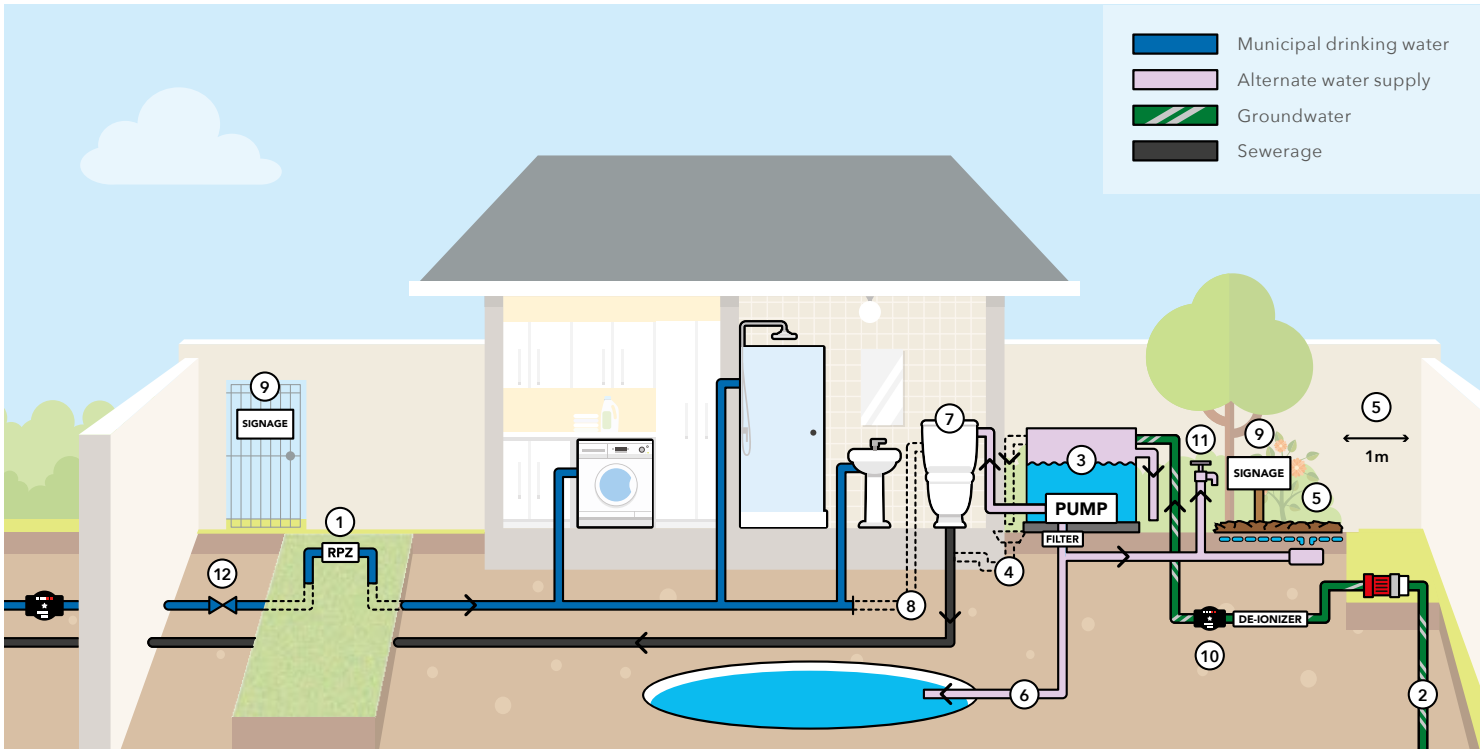
Select your service providers based on factors such as their qualifications, experience, cost estimates and availability. Together with the drilling company, consult the building plans of your house to ensure that the drilling and installation does not take place where underground electrical cables, sewer drainage pipes and water plumbing pipes are situated.

Submit applications to the City and DWS, if necessary (see section 6.2 and 6.3).

Submit a building plan to the City for the authorisation of a water tank, where applicable (see section 6.4).

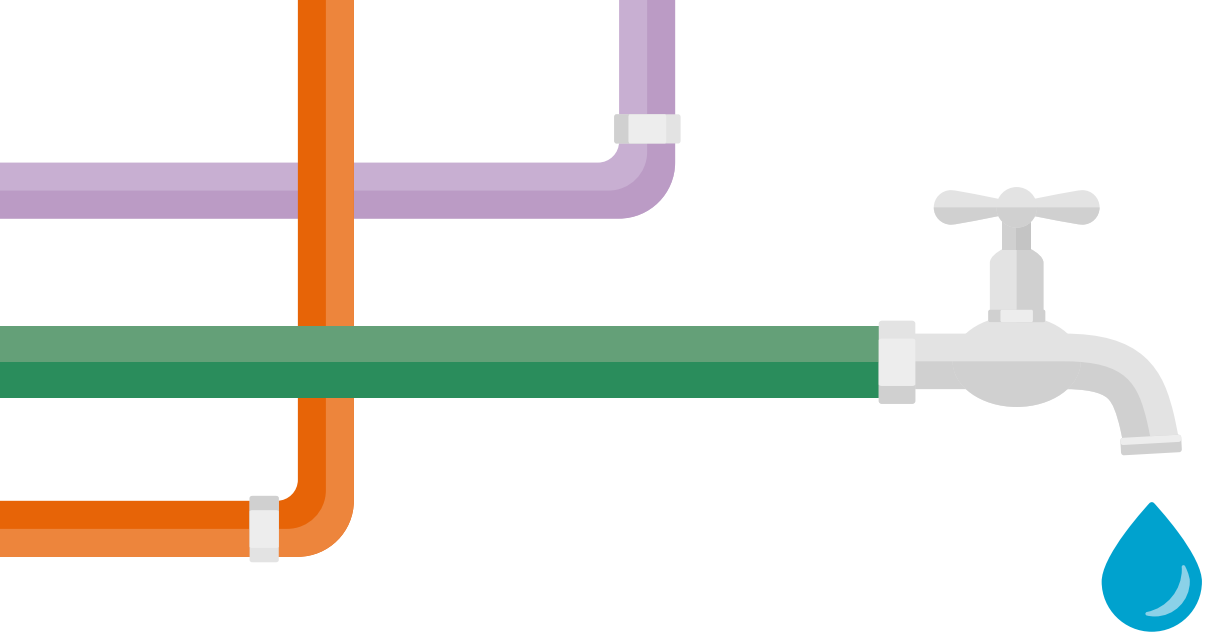
12.2. Installation

The outdoor and indoor use of groundwater is illustrated on page 53. All the principles and requirements contained in the illustration and the numbered explanatory notes are in line with the City's Water By-law (amended in 2018) and current policy context for the lawful use of groundwater systems.



Groundwater for outdoor use and toilet flushing

1. Municipal drinking water supply into property fitted with a RPZ valve back-flow preventer (mandatory). The RPZ must be installed immediately downstream of the private stopcock inside the property boundary, above ground, and according to SANS 10252-1:2016 (Edition 3.1). See the technical drawing/sketch guidance in annexure 4.
2. Groundwater sources (wellpoint, borehole or spring water) connected to storage tank.
3. Groundwater collection and treatment (if required based on testing) in storage tank. Tank installations may be below or above ground, but must comply with national building regulations, SANS 2001-CC2 if you're constructing a concrete base, and the manufacturer's specifications. Any underground tank installation must also be at least 1 m away from the boundary wall.
4. Storage tank overflow should discharge into the stormwater system or a garden for aquifer recharge, although only if not treated. If treated with chemicals, the overflow must discharge into sewer.
5. Groundwater for drip/subsurface irrigation under a thick layer of mulch (groundwater should not be sprayed because of health reasons and to reduce evaporation), vehicle washing and/or hard-surface cleaning.
6. Groundwater for topping up pool. Pool cover as per water restrictions in place at the time.
7. Groundwater for toilet flushing.
8. Municipal water supply to cistern must be disconnected.
9. Official, weather-proofed signage to be placed in main thoroughfare (entrance) and at points of use to warn people against using the groundwater for drinking, cooking and ablution.
10. Borehole water meter to be installed by owner as per DWS requirement.
11. If the installation includes a tap that people may be tempted to drink from, use or waste, preferably lock it or turn it into a 'demand' tap.
12. Install a private stopcock after the boundary wall and before the RPZ valve back-flow preventer.



Additional guidelines

- Ensure that the appropriate colour-coding for alternative water pipes is used (see section 7).
- Ensure that the official signage for the use of alternative systems is displayed on your property (see section 8).
- DWS gazetted a notice on limitations and related matters around borehole, wellpoint and surface water (rivers and streams). This took effect on 12 January 2018 and includes the following requirements:
  - All water sector groups and individuals who abstract surface or groundwater must install electronic water-recording, monitoring or measuring devices. The volumes of water abstracted must be reported to **metering@dws.gov.za** every Monday.
  - Existing groundwater users in the Cape Town catchment area (domestic and industrial) must now abstract 45% less than their average use in the five years from 2010 to 2015.
  - DWS's permission is required to sell or buy borehole or wellpoint water.

12.3. Post-installation

Registration of borehole or wellpoint
(see section 6.2).

Borehole or wellpoint signage to be displayed at all times.

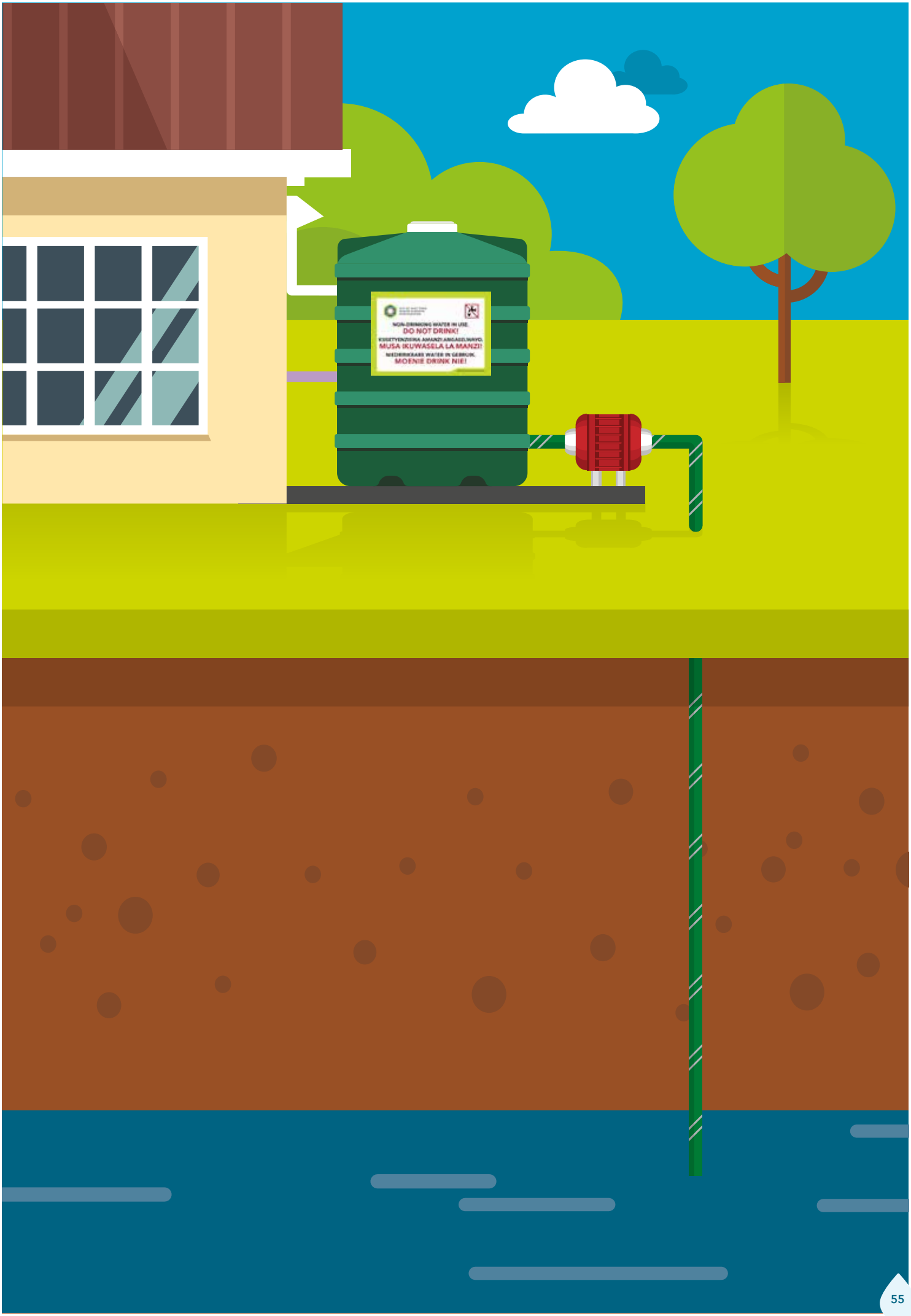
Following registration, the City will make available a sign indicating the use of non-drinking wellpoint or borehole water as well as a unique registration number. This must be clearly displayed at all times in the main thoroughfare of your property and at any extraction points such as taps.

Prevention of over-extraction and pollution

Use groundwater sparingly/efficiently. This means using it for only priority essential purposes (e.g. toilet flushing) in times of drought, and in accordance with the restrictions in place at the time. Also comply with DWS's gazetted notice on 12 January 2018 which includes limitations and related matters around borehole, wellpoint and surface water (rivers and streams), which requires that existing groundwater users (domestic and industrial) should abstract 45% less than their average use in the five years from 2010 to 2015. In addition, measures should be taken to prevent any pollution of groundwater.

Regular maintenance of your groundwater system. Cover the pump to protect it from the sun, rain, wind and adverse weather conditions. Ensure that the power supply and components to the borehole or wellpoint pump are kept dry and are not exposed to rain, water, wet conditions or moisture. The non-return valve must be checked frequently to ensure that no solids or sand grains are trapped inside, preventing it from closing fully. During the winter months, when boreholes and wellpoints are used less frequently due to winter rains, the pump must be switched on at least once every one to two weeks and left to run for one to two minutes. Clean nozzles and filters of irrigation sprinklers frequently to prevent clogging.

Note that the national standard SANS 10299 Parts 1 to 9 apply to the maintenance and management of groundwater resources. If tanks are involved, regular disinfection of the storage tank(s) must comply with SANS 10252:1 (as amended).


NON-DRINKING WATER IN USE
DO NOT DRINK!
MUSA IKUWASELA LA MANZI!
MOENIE DRINK NIE!

13. CHECKLIST FOR TREATED EFFLUENT FROM THE CITY'S WASTEWATER TREATMENT PLANTS

Treated effluent is only available in certain areas of the city, and a connection to the pipe network depends on your property location and other factors. Your application will be assessed in terms of the availability of treated effluent in your area, your expected consumption, and potential savings in drinking water use.

13.1. Pre-installation

Submit an application to the City for the installation of an alternative water system (see section 6.3).

Submit a building plan to the City for the authorisation of a water tank, where applicable (see section 6.4).

13.2. Installation

- Ensure that the appropriate colour-coding for alternative water pipes is used (see section 7).
- Ensure that the official signage for the use of alternative systems is displayed on your property (see section 8), warning people against using the treated effluent for drinking, cooking and ablution.
- There may be no interconnection between treated effluent and the municipal drinking water supply. Municipal drinking water supply into a property must be fitted with a RPZ valve back-flow preventer (mandatory) in terms of SANS 1808-15:2011.
- The RPZ must be installed immediately downstream of the private stopcock inside the property boundary, above ground, and according to SANS 10252-1:2016 (Edition 3.1). See the technical drawing/sketch guidance in Annexure 4.
- The City may install the treated-effluent connection, isolating valve and the treated-effluent flow meter to the premises. The treated-effluent flow meter must be installed outside the property boundary and may be operated by authorised City officials only, as per the Treated Effluent By-law.

- Storage tanks should not be left full for an extended period of time, as this causes odours to develop.
- All pipes and fittings must meet the specifications outlined in SANS 10252-1:2016.
- Taps, valves and sprayers of the irrigation system must be designed so that only authorised persons can open or operate them, and should cause no unnecessary or excessive misting or overspray.
- Sprinkler irrigation is allowed only if no spray is blown over to areas where such irrigation is forbidden. The quality of the effluent, the use of adjoining areas and their proximity to the irrigation area must be taken into consideration before sprinkler irrigation is permitted. The sprinkler system may not be combined with the municipal drinking water supply.
- A treated-effluent tracer or food dye could be added to the treated effluent so that it may be easily distinguished from drinking water to draw users' attention to cases of contamination.
- If the installation includes a tap that people may be tempted to drink from or use, preferably lock it or turn it into a 'demand' tap.

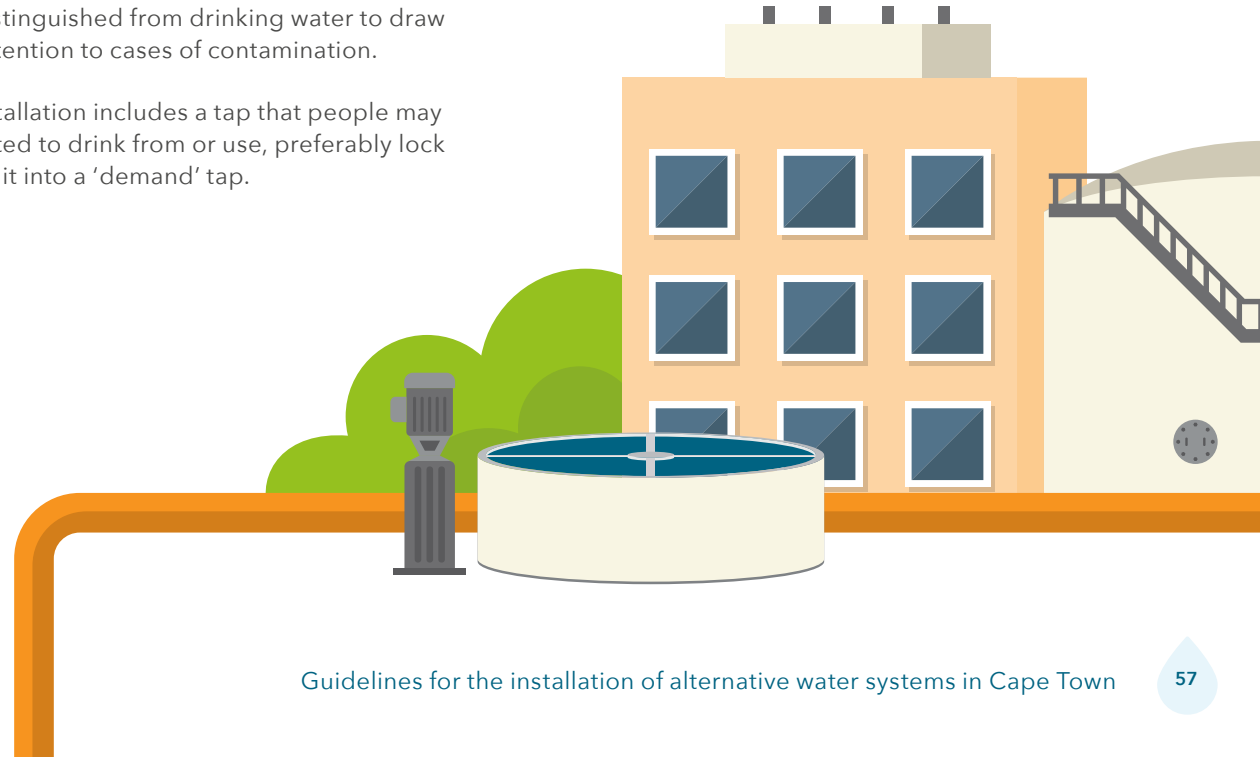
13.3. Post-installation

Signage must be displayed at all times (see section 8).

Annual audit

The City's Inspectors conduct annual audits of treated-effluent installations. These include testing the RPZ back-flow preventer as outlined in the national standard SANS 1808-15:2011, as well as testing the functioning of the infrastructure to ensure that hazards do not arise during operation. The registered user is responsible for allowing the inspectors access for such audit and testing, as well as for the associated costs.

If water storage tanks are involved, regular disinfection of the storage tank(s) must comply with SANS 10252:1 (as amended).

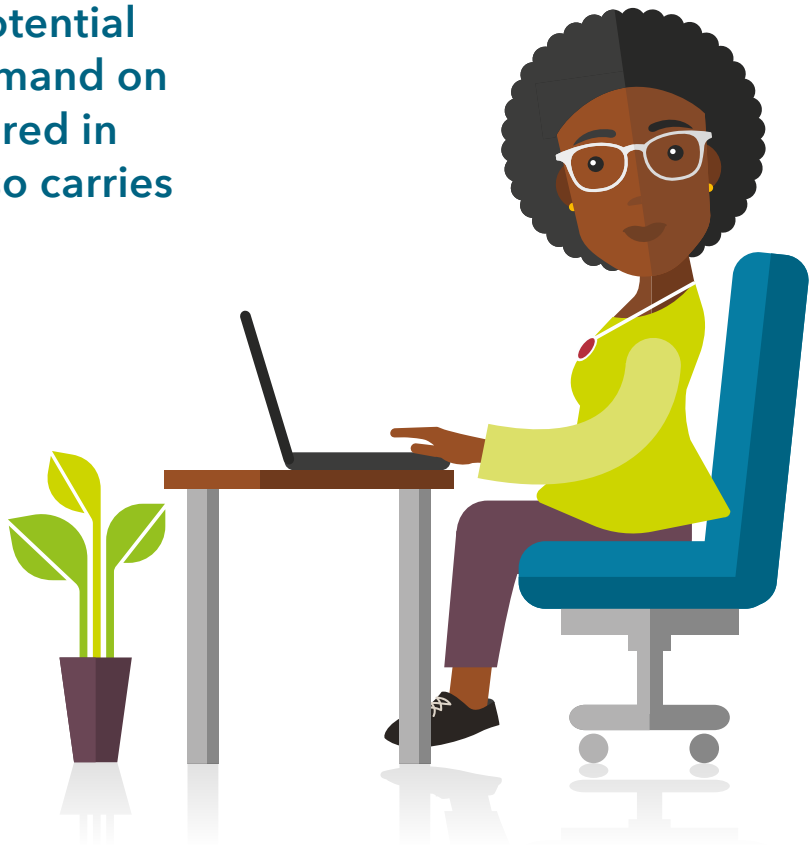


14. CONCLUSION

The drought crisis has shown the City and its residents that a new relationship with water is needed. This includes maximising the use of alternative water as we gear up for the 'new normal' of unreliable rainfall and long-term water scarcity in our region. Alternative water has significant potential to reduce our demand on surface water stored in our dams, but also carries significant risks.

Therefore, alternative water use and installations have to be well managed to prevent it from contaminating municipal drinking water and to avoid health risks and environmental damage.

The City has drafted these guidelines in good faith and after due consideration of multiple factors, including legislative requirements, health, environmental and socio-economic risks, and the recent drought context experienced in Cape Town. Also note that the guidelines will be updated as water regulations and legislation change over time. Please consult the City's website for future editions.



15. ACKNOWLEDGEMENTS

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Pieter Koekemoer and Richard Walton

Communication:

Aletta Kruger and Alison Smith

The Office of the Executive Director: Water and Waste Services:

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Stakeholder workshops and consultations

Government and public or non-profit institutions

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- Council of Scientific and Industrial Research (CSIR)
- GreenCape
- Green Building Council South Africa (GBCSA)
- National Department of Water and Sanitation (DWS)
- South African Bureau of Standards (SABS)
- Water Research Commission (WRC)

Alternative water installers and related product suppliers

- Aquarista
- Basic Azure
- Maskam Water
- OwnGrown: sustainable urban gardens
- Purerain
- Water Rhapsody
- Alternate Water Solutions (AWS)
- Equilibrium Water
- Re-Solve
- 4EVR Plastics

Consultants and Consulting Engineers

- Aurecon
- Ecolution Consulting
- JG Afrika
- Water Electricity Saving Consultants
- WSP Engineering
- Ecolution Consulting
- Isidima Design

Plumbing Industry Representatives

- Institute of Plumbing South Africa (IOPSA)
- Plumbing Industry Registration Board (PIRB)

Academic Institutions

- University of Cape Town - Future Water

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- General Authorisation in Government Gazette Notice 665 on 6 September 2013: Revision of General Authorisations in terms of Section 39 of the National Water Act, 1998 (Act 36 of 1998); including:
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  - Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit; and disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process
  - Disposing of waste in a manner in which may determinately impact on a water resource
  - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people
- General Authorisation in Government Gazette Notice 398 of 26 March 2004 for:
  - impeding or diverting the flow of water in a watercourse;
  - altering the bed, banks or characteristics of a watercourse; and
  - removing water found underground for continuation of an activity or for the safety of people - revised
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- The rehabilitation of water boreholes, Part 7, SANS 10299-7:2003
- The management of water boreholes, Part 8, SANS 10299-8:2003
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17. ANNEXURE 1: SUMMARY OF SOUTH AFRICAN WATER QUALITY GUIDELINES

	VOLUME	1	2	2	3	3	3	3	4	5	6	7	
	YEAR	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	
	EDITION	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	1st	NA: Not available, NR: Not relevant
	UNITS	Domestic (human consumption)	Recreation full contact	Recreational intermediate contact	Industry Category 1	Industry Category 2	Industry Category 3	Industry Category 4	Agricultural irrigation	Agricultural Livestock watering	Agriculture Aquaculture	Aquatic Ecosystems	
Algae (Chlorophyll a)	µg/L chl a	0-1 (a)	0-15 (free floating algae)	NA	NA	NA	NA	NR	NA	NA	NA	NA	(a) µg/l chl a;
Algae	cells/ml	0 - 50 (a) 0 - 0.8 (b)	0 - 6 (a)	NA	NA	NA	NA	NR	NA	<6.0 (c) <2000 (d)	NA	NA	(a) blue green algal cells/ml (b) µg/l of microcystin (c) blue-green algae colonies/0.5mL in a 2 min scan at 200x magnification (d) microcystin cells/mL
Alkalinity	mg/L	NA	NA	NA	0 - 50	0 - 120	0 - 300	0 - 1200	NA	NA	20 -100	NA	
Aluminium	mg/L	0 - 0.15	NA	NA	NA	NA	NA	NR	0 - 5	0 - 5	<0.03	<0.005	
Ammonia	mg NH3/L	0 - 1.0	NA	NA	NA	NA	NA	NR	NA	NA	0 - 0.025 (a) 0.3 - 2.0 (b)	<0.007	(a) cold water species (b) warm water species
Arsenic	mg/L	0 - 0.01	NA	NA	NA	NA	NA	NA	0 - 0.01	0 - 1	0 - 0.05	<0.01	
Asbestos	fibres/L	0 - $1x10^6$	NA	NA	NA	NA	NA	NA	NA	NA	NR	NA	
Atrazine	mg/L	0 - 0.002	NA	NA	NA	NA	NA	NR	NA	NA	<0.0002	<0.01	
Beryllium	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.01	NA	NA	NA	
Boron	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.5	0 - 5	NA	NA	
Cadmium	µg/L	0 - 5	NA	NA	NA	NA	NA	NA	0 - 10	0 - 10	0 - 0.2	0.15	
Calcium	mg Ca/L	0 - 32	NA	NA	NA	NA	NA	NA	NA	0 - 1000	NA (a)	NA	(a) see Total Hardness guideline
Carbon Dioxode	mg/L	NA	NA	NA	NA	NA	NA	NR	NA	NA	12	NA	
Chemical Oxygen Demand	mg/L	NA	NA	NA	0 - 10	0 - 15	0 - 30	0 - 75	NA	NA	NR	NA	
Chloride	mg/L	0 - 100	NA	NA	0 - 20	0 - 40	0 - 40	0 - 500	0 - 1.0	0 - 1500 (a) 0 - 3000 (b)	0 - 600	NA	(a) monogastrics and poultry (b) other livestock
Chromium VI	mg/L	0 - 0.05	NA	NA	NA	NA	NA	NA	0 - 0.1	0 - 1	<0.002	<0.007 <0.012 (a)	(a) Chromium (III)
Cobalt	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.05	0 - 1	NA	NA	

	VOLUME	1	2	2	3	3	3	3	4	5	6	7	
	YEAR	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	
	EDITION	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	1st	NA: Not available, NR: Not relevant
	UNITS	Domestic (human consumption)	Recreation full contact	Recreational intermediate contact	Industry Category 1	Industry Category 2	Industry Category 3	Industry Category 4	Agricultural irrigation	Agricultural Livestock watering	Agriculture Aquaculture	Aquatic Ecosystems	
Coliforms	counts/100mL	0 (b) 0 - 5 (c)	0 - 150 (b) 0 - 130 (a)	0 - 1000 (b)	NA	NA	NA	NA	<1(b)	0 - 200 (b)	NA	NA	(a) E coli (b) faecal coliforms (c) total coliforms
Coliphages	counts/100mL	0 - 1	0 - 20	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Copper	mg/L	0 - 1	NA	NA	NA	NA	NA	NA	0 - 0.2	0 - 0.5 (a) 0 - 1 (b) 0 - 5 (c)	0.005	<0.0003	(a) sheep and pre-weaned calves (b) cattle (c) horses, pigs and poultry
Cyanide	mg HCN/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.001	
Dissolved Organic Carbon	mgC/L	0 - 5	NA	NA	NA	NA	NA	NA	NA	NA	NR	NA	
Dissolved Oxygen	mgC/L	NA	NA	NA	NR	NR	NR	NR	NA	NA	6 - 9 (a) 5 - 8 (b)	80% - 120% saturation	(a) cold water species (b) intermediated and warm water species
Endosulfan	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.003	<0.01	
Enteric Viruses	$TCID_{50}$/10L	<1	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Faecal Streptococci	counts/100mL	NA	0 - 30	0 - 230	NA	NA	NA	NA	NA	NA	NA	NA	
Fluoride	mg/L	0 - 1	NA	NA	NA	NA	NA	NA	0 - 2	0 - 2 (a) 0 - 6 (b)	NA	<0.75	(a) all other livestock (b) ruminants
Herbicides		NA	NA	NA	NA	NA	NA	NA	NA	NA	(a)	NA	(a) refer to the guideline (pg75)
Iron	mg/L	0 - 0.1	NA	NA	0 - 0.1	0 - 0.2	0 - 0.3	0 - 10	0 - 5	0 - 10	0.01	NA	
Lead	mg/L	0 - 0.01	NA	NA	NA	NA	NA	NA	0 - 0.2	0 - 0.1 (a) 0 - 0.5 (b)	0 - 0.01	<0.0002	(a) all other livestock (b) pigs
Lithium	mg/L	NA	NA	NA	NA	NA	NA	NR	0 - 2.5	NA	NA	NA	
Magnesium	mg/L	0 - 30	NA	NA	NA	NA	NA	NA	NA	0 - 500	NA	NA	
Manganese	mg/L	0 - 0.05	NA	NA	0 - 0.05	0 - 0.1	0 - 0.2	0 - 10.0	0 - 0.02	0 - 10	<0.1	<0.18	
Mercury	mg/L	0 - 0.001	NA	NA	NA	NA	NA	NA	NA	0 - 1.0	0 - 0.001	<0.04	
Molybdenum	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.01	0 - 0.01	NA	NA	
Nickel	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.2	0 - 1	NA	NA	

	VOLUME	1	2	2	3	3	3	3	4	5	6	7	
	YEAR	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	
	EDITION	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	1st	NA: Not available, NR: Not relevant
	UNITS	Domestic (human consumption)	Recreation full contact	Recreational intermediate contact	Industry Category 1	Industry Category 2	Industry Category 3	Industry Category 4	Agricultural irrigation	Agricultural Livestock watering	Agriculture Aquaculture	Aquatic Ecosystems	
Nitrate/ Nitrite	mg/L	0 - 6 (a) 0 - 6 (b)	NA	NA	NA	NA	NA	NA	See Nitrogen (inorganic)	0 - 100 (a) 0 - 10 (b)	0 - 0.05 (a)	See Nitrogen (inorganic)	(a) NO3 (b) NO2
Nitrogen (Inorganic)	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.5 (a)	NA	NR	<0.5 *	* A TWQR should only be derived after case and site-specific studies, the inorganic nitrogen of surface waters should not be changed more than 15% (a) irrigation equipment
Odour	Ton	1	NA	NA	NA	NA	NA	NA	NA	NA	NR	NA	
Parasites											(a)		(a) refer to the guideline (pg 105)
PCBs (Polychlorinated Biphenyls)		NA	NA	NA	NA	NA	NA	NA	NA	NA	(a)	NA	(a) The detection of any PCB levels should be regarded as serious
Pesticides		NA	NA	NA	NA	NA	NA	NA	NA	NA	(a)	NA	(a) refer to the guideline
pH	pH units	6 - 9	6.5 - 8.5	NA	7.0 - 8.0	6.5 - 8.0	6.5 - 8.0	5 - 10	6.5 - 8.4	NA	6.5 - 9.0	*	* pH values should not be allowed to vary from the range of the background pH values for a specific site and time of day, by >0.5 of a pH unit, or by >5%, and should be assessed by whichever estimate is the more conservative
Phenol	µg/L	0 - 1	NA	NA	NA	NA	NA	NA	NA	NA	<1000	<30	
Phosphorus (Inorganic)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<5	
Potassium	mg/L	0 0 50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Protozoan Parasites	cysts or oocysts/10L	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA(a)	NA	(a) refer to the guideline
Radionuclides	Bq/L	0 - 0.5 (a) 0 - 1.38 (b) 0 - 0.89 (c) 0 - 0.228 (d) 0 - 0.42 (e) 0 - 11 (f) 0 - 0.42 (g)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	(a) Gross alpha activity (b) Gross beta activity (c) ^{238}Uranium (d) ^{232}Thorium (e) ^{226}Radium (f) ^{222}Radon (f) ^{228}Radium
Selenium	mg/L	0 - 0.02	NA	NA	NA	NA	NA	NA	0 - 0.02	0 - 50	0 - 0.3	<0.002	

	VOLUME	1	2	2	3	3	3	3	4	5	6	7	
	YEAR	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	
	EDITION	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd	1st	NA: Not available, NR: Not relevant
	UNITS	Domestic (human consumption)	Recreation full contact	Recreational intermediate contact	Industry Category 1	Industry Category 2	Industry Category 3	Industry Category 4	Agricultural irrigation	Agricultural Livestock watering	Agriculture Aquaculture	Aquatic Ecosystems	
Silica	mg/L	NA	NA	NA	0 - 5	0 - 10	0 - 20	0 - 150	NA	NA	NA	NA	
Sodium	mg/L	0 - 100	NA	NA	NA	NA	NA	NA	<70	0 - 2000	NA(a)	NA	(a) see TDS guideline
Sodium Absorption Rate		NR	NR	NR	NR	NR	NR	NR	0 - 1.5	NR	NR	NR	
Sulphate	mg/L	0 - 200	NA	NA	0 - 30	0 - 80	0 - 200	0 - 500	NA	0 - 1000	NA	NA	
Sulphides	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	0 - 0.001 (a)	NA	(a) H2S
Suspended Solids	mg/L	NA	NA	NA	0 - 3	0 - 5	0 - 5	0 - 25	0 - 50 (a)	NA	<50 (b) <20000 (c)	NA	(a) clogging of drip irrigation systems (b) clear water species (c) turbid water species
Temperature	Degree Celcius	NA	NA	NA	NA	NA	NA	NA	NA	NA	(a)	NA	(a) refer to the guideline
Total Dissolved Gases	% TGP	NA	NA	NA	NA	NA	NA	NA	NA	NA	<100 (a) <105 (b)	NA	(a) cold water fish (b) intermediate/warm water fish
Total Dissolved Solids	mg/L	0 - 450	NA	NA	0 - 100	0 - 200	0 - 450	0 - 1600	<40	0 - 1000 (a) 0 - 2000 (b) 0 - 3000 (c)	NA (d)	*	* TDS should not change by >15% from the normal cycles of the water body under impacted conditions at any time of the year (a) dairy, pigs and poultry (b) cattle and horses (c) sheep (d) see TDS guideline
Total Hardness	mg CaCO3/L	NA	NA	NA	0 - 50	0 - 100	0 - 250	0 - 1000	<0.2	NA	20 - 100	NA	
Trihalomethanes	µg/L	0 - 100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Turbidity	NTU	0 - 1	<3.0 (a)	NA	NA	NA	NA	NA	NA	NA	<25 (b)	NA	(a) Secchi disc depth (b) clear water species
Uranium	mg/L	NA	NA	NA	NA	NA	NA	NA	0 - 0.01	NA	NA	NA	
Vanadium	mg/L	0 - 0.1	NA	NA	NA	NA	NA	NA	0 - 0.1	0 - 1	NA	NA	
Zinc	mg/L	0 - 3	NA	NA	NA	NA	NA	NA	0 - 1	0 - 20	<0.03	<0.002	

18. ANNEXURE 2:
SAFE USE OF GREYWATER

A guide to what kind of greywater can be re-used where, and how to use it safely.

In the serious drought crisis, the City asked its residents to use as little water as possible. Reusing some water is one way to achieve this. Typically, 50-80% of indoor water used in the home can be reused as greywater. However, greywater often contains harmful bacteria/germs, which may result in disease. Therefore, the use of greywater needs to be well managed to avoid any health and environmental risk. Follow the advice below to ensure that you use the different types of greywater safely and effectively.

Important to note

- This guide applies to greywater that is used within 24 hours, and for general (manual) 'bucketing' use in, for example, formal dwellings, businesses, sports and other clubs, schools and places of worship. Greywater that is stored for longer than 24 hours needs treatment and disinfection as advised by a specialist.
- In times of extreme water shortage, greywater may be used for essential indoor uses only, such as flushing toilets, and not for non-essential outdoor uses, such as garden irrigation and/or vehicle washing.
- While this guide describes safe greywater use for urban consumers in drought conditions, users are urged also to perform their own safety checks and use their own discretion.

WHAT IS GREYWATER?

Greywater is untreated wastewater from baths and showers (body washing) and hand-washing basins. Laundry water from washing machines or hand washing only qualifies as greywater for reuse if environmentally friendly detergents have been used. Depending on the source, greywater can contain bacteria, pathogens, organic material, oil and grease, soap and detergent residue, pesticide residue, dirt, lint, sodium, nitrates and phosphates, high salt and pH levels, bleach, hair and skin particles.

Greywater is not toilet water (which contains faecal matter and germs/pathogens) or water used in spas, jacuzzis and pools. Water from kitchen sinks and dishwashers contain grease, fats, oils, bacteria and food/other solid particles, and must not be reused.

Greywater use is entirely at the risk of the consumer. In terms of the City's Water By-law, the City cannot be held liable for any consequential damage or loss arising directly or indirectly from such use.

General rules for greywater use

WHAT TO DO	WHAT NOT TO DO
• Sanitise your hands after use. • Use environmentally friendly detergents and soaps, wherever possible. • To install an alternative water system (e.g. borehole) that requires plumbing, see conditions for safe and legal installation at **www.capetown.gov.za/thinkwater** and consult a specialist.	• Don't store for longer than 24 hours, as this will lead to bad odour, slime build-up and health risks. If greywater is stored for longer than 24 hours, it will need filtration, disinfection and treatment as advised by a specialist. • Don't use if any household member is sick. • Don't reuse nappy-washing water. • Don't allow children and animals to come into contact with greywater. • Don't ever ingest/swallow greywater. • Don't spray greywater. Spraying disperses and spreads pathogens (through aerosols). • Don't allow greywater to leave the property and flow into stormwater drains or stream/rivers. • Once you have used some greywater, don't use that same greywater for anything else.

Greywater conditions of use to reduce risk during toilet flushing, vehicle cleaning and garden irrigation

SOURCE OF GREYWATER	POSSIBLE CONTENTS	POSSIBLE USE
'Warm-up'/lag water Cold water that runs from taps or showerheads while waiting for hot/warm water to emerge. This is water from the geyser which typically gets cold in the pipes leading from the geyser to your tap, while waiting for use.	This is still good-quality water and is 'low-risk' if used immediately and collected in clean, sanitary containers, and not combined with other water sources. Not recommended for drinking. If it comes into contact with human bodies or potentially unclean surfaces, it is considered to be greywater.	• Flushing toilets • Cleaning indoor surfaces • Laundry washing • Dishwashing
Shower and bath water	Bacteria, hair, organic material, skin particles, lint, oil and grease, soap and detergents	• Flushing toilets* • Cleaning vehicles* • Garden irrigation*
Laundry water – from washing machine or hand-washing The rinse water from a washing machine cycle carries the lowest risk, if you are able to capture it separately from the rest. Preferably use to wash vehicles, as other greywater can leave a residue. Rinse water can also be used for the next wash cycle.	Dirt, lint, organic material, oil and grease, sodium, nitrates and phosphates (from detergent), high salt and pH levels, bleach	• Flushing toilets* • Cleaning vehicles* • Garden irrigation*
Hand-basin washing water	Bacteria, organic material, oil and grease, soap and detergent residue	• Flushing toilets* • Cleaning vehicles* • Garden irrigation*
Vegetable and fruit rinsing water	Bacteria, organic matter, and pesticide residue	• Flushing toilets* • Cleaning vehicles* • Garden irrigation*

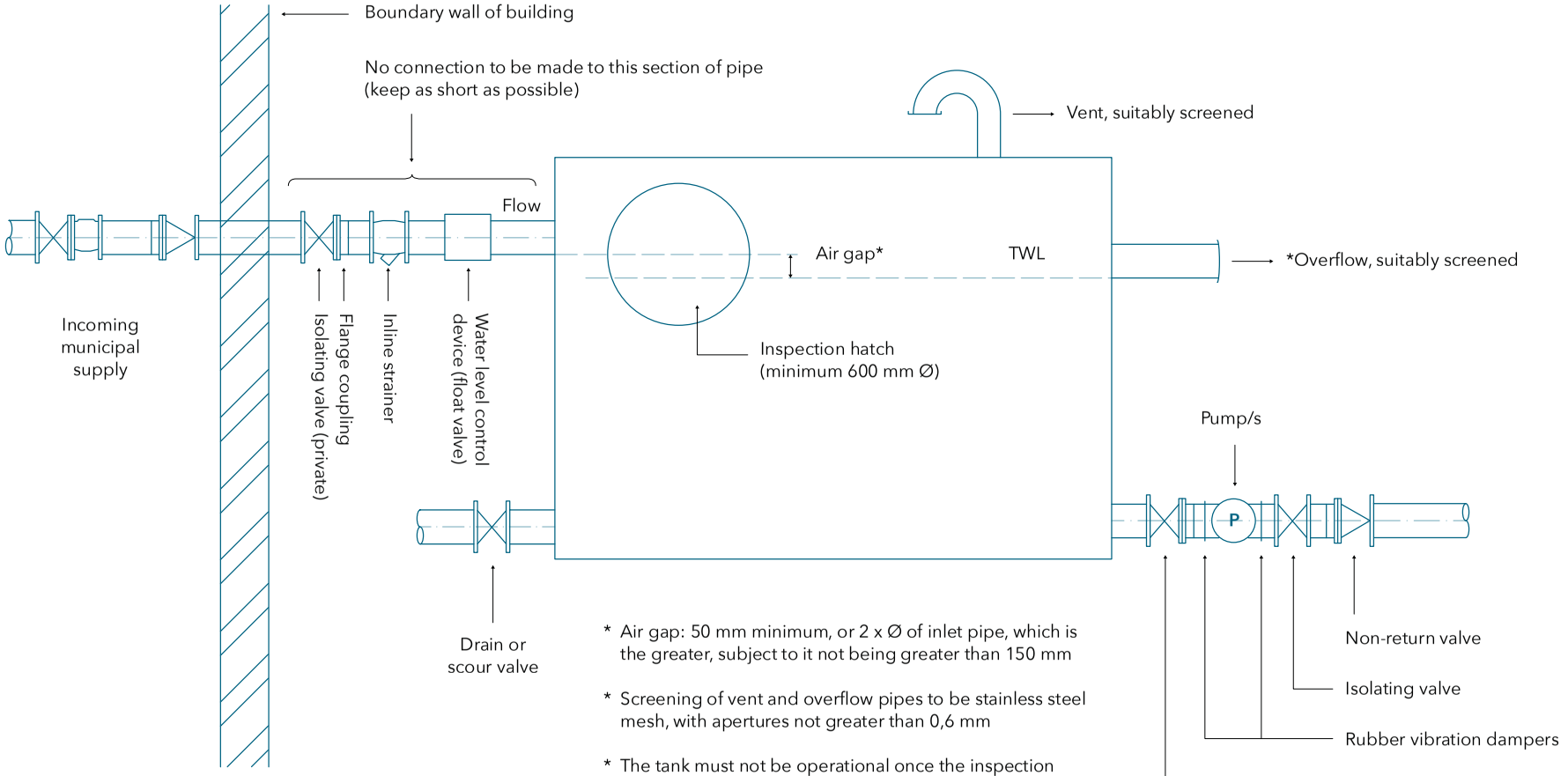
*Use with caution. See "Greywater conditions of use to reduce risk during toilet flushing, vehicle cleaning and garden irrigation" alongisde.

Greywater conditions of use to reduce risk during toilet flushing, vehicle cleaning and garden irrigation

USE	CONDITIONS OF USE TO REDUCE RISKS
 Flushing toilets	• Use a jug and carefully pour greywater directly into the toilet bowl. Avoid splashing, as it may spread pathogens through aerosols, particularly from faecal matter. Keep the toilet and surrounding area disinfected. • If you are using jugs or buckets to manually flush the toilet, do not pour it into the cistern, as the greywater can flow back into the drinking water system and contaminate it. That would pose a serious health hazard to people on your property as well as others in the area. Even if you have turned off the 'angle valve'/stopcock, which is usually at the base of the toilet, this cannot prevent back-flow. If you have a greywater system installed, the drinking water supply should be completely disconnected from the toilet. Regularly check for leaks, as greywater can clog up the valve mechanism.
 Cleaning vehicles	• Exercise discretion when using greywater to wash vehicles, as very soapy water may leave a residue. • Environmentally friendly detergents, soaps and shampoos must be used in the washing machine if this water is to be reused. This prevents harmful chemicals from entering the stormwater or surface water systems. • If possible, wash the car on permeable ground (grass or dirt), away from any surface water, so that the water does not run off hard surfaces (driveways, roads and pavements) into stormwater systems. The runoff may contain oils, dirt and hazardous chemicals, which are harmful to water systems and the environment.
 Irrigating food gardens	• Prioritise the use of low-risk water, e.g. rinse water from the washing machine. • Always ensure that greywater never comes into contact with the aboveground part of fruit or vegetable plants in the garden. Water the roots only. • To avoid direct contact with edible food plants, use drip irrigation with a thick layer of mulch on top. No greywater should be used on leafy vegetables (e.g. spinach) and root vegetables (e.g. carrots). • Always wash fruit and vegetables before preparing them, and cook root vegetables first if they have had (subsurface) greywater irrigation. Avoid hosing, spraying or misting irrigation methods.
 Irrigating non-food gardens i.e. lawn and plants	• Greywater can make soil alkaline and result in salt build-up, which may damage soil quality and be harmful to plants. Seek advice from garden centres or experts, and use with discretion. • Spread the water across the garden to avoid soil clogging or pooling, which attracts mosquitoes and leads to grey/green slime areas developing. • Do not irrigate within 48 hours of rain, as it may pool on the surface if the soil is wet. • Do not use hosing, spraying (or misting) methods when watering to prevent the spread and inhalation of airborne germs. The use of sprinklers is discouraged. However, if you do use sprinklers, ensure these are low-spray with large water droplets. Rather use drip/subsurface irrigation with a layer of mulch on top. • Avoid/limit the use of greywater in parts of the garden frequented by people and animals. • Water the garden at night to avoid human contact for eight hours after irrigation, and to reduce evaporation. • Environmentally friendly detergents, soaps and shampoos must be used in the washing machine if this water is to be reused. These are low in phosphorus, sodium, boron and chloride, and reduce negative impacts on soil, plants and ultimately the water system. Phosphate is particularly dangerous to the environment. • Rinse water from the washing machine (if not used for the next wash cycle, vehicle washing or toilet flushing) poses the lowest risk to plants. If you are able to capture it separately, prioritise its use in the garden. • Water only well-established plants with greywater, and monitor them for signs of stress (e.g. yellowing, wilting or mottled colour). Rather use alternative water (e.g. rainwater harvesting) for new plants. • Consider planting salt-tolerant plants if your plants shows stress from greywater irrigation.

Greywater should be used for flushing toilets as an essential use priority. In times of extreme water shortage, greywater use for garden irrigation and/or washing vehicles may not be permitted.

19. ANNEXURE 3: STANDARD FOR CONTAMINATION-PROOF TANK WITH AIR GAP IN LIEU OF RPZ BACK-FLOW PREVENTER



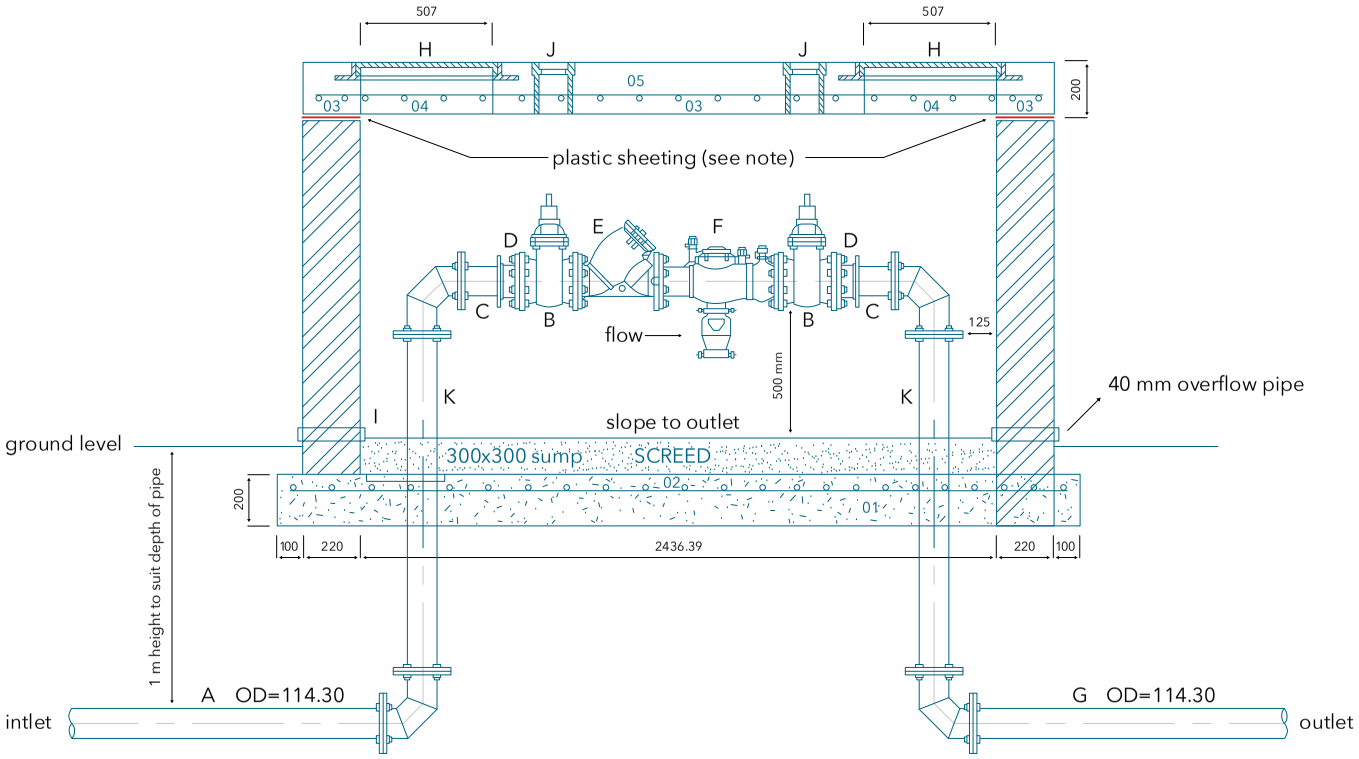
* Air gap: 50 mm minimum, or 2 x Ø of inlet pipe, which is the greater, subject to it not being greater than 150 mm

* Screening of vent and overflow pipes to be stainless steel mesh, with apertures not greater than 0,6 mm

* The tank must not be operational once the inspection hatch is removed. Note the positioning of the inspection hatch in relation to the water level

CITY OF CAPE TOWN Reticulation Services G.Kaiser Executive Director: Informal Settlements, Water & Waste	project title STANDARD	drawing title CONTAMINATION-PROOF TANK WITH AIR GAP, IN LIEU OF RPZ BACK-FLOW PREVENTER	scale N.T.S	drawing no. W4-4253/1	drawn E.B.	date 10-07-18

20. ANNEXURE 4: STANDARD FOR REDUCED PRESSURE ZONE (RPZ) BACK-FLOW PREVENTER INSTALLATION



SPECIFICATION

Roof slab = 200 mm thick
Walls = 220 mm thick
Floor slab = 200 mm thick
Concrete = 30 MPa
Cover = 50 mm
Plastic sheeting = 375 micron embossed
D.P.C. SABS 952/1962 Type B to be placed on all walls before roof slab is cast

PARTS LIST

A Incoming water from municipal mains
B 2 off 114 mm Ø double flange valve
C 2 off 114 mm Ø flange spigot
D 2 off 114 mm Ø flange adaptor coupling
E 1 off 114 mm Ø in line strainer
F 1 off 100 mm Ø RPZ valve (as per manufacturer's specification)
G Feed toward private installation
H 2 off cover and frame (W4-C-004)
I 40 mm Ø overflow pipe outlet to be 75 mm above ground
J 2 off belltobies
K 2 off 1500 double flange extension

SANS 10252-1:2016

D.5.1.4 For all testable devices, resilient seated (drop tight when close) isolating valve shall be installed in the following positions:

a) immediately upstream of the line strainer or immediately upstream of the device in vases where: no integral strainer is fitted (see D512): and

b) immediately downstream of the device

D.5.3 Location of device

D.5.3.1 Back-flow prenetion deives shall not be located in corrosive or polluted atmosphere, where the contaminated air can enter the piping system through the air gap or open vent port, or cause the device to malfunction.

D.5.3.2 Insulation or any other protection of a back-flow prevention device shall not interfere with its operation, testing or maintenance.

D.5.3.3 Vented testable back-flow prevention device shall not be located in pits.

D.5.3.4 Back-flow prevention devices shall not be buried in the ground.

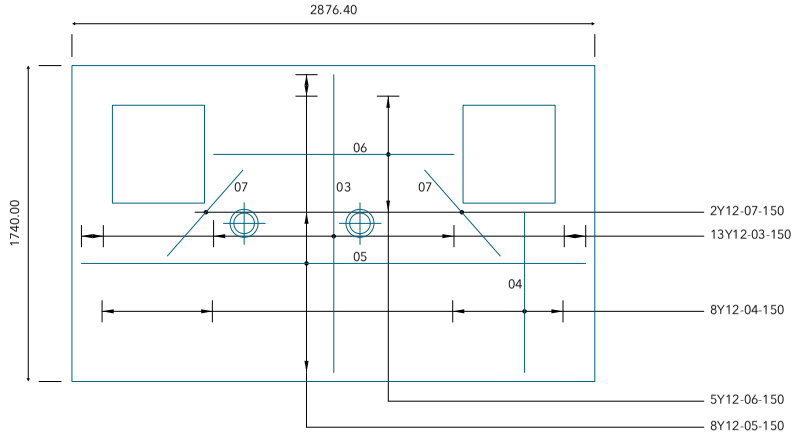
D5.5 Drainage and leakage

Back-flow prevention devices shall be positioned so that any leakage from the air ports of vacuum breakers, or drainage from reduce pressure zone devices and vented double check valves shall be readily visible, but not constitute a hazard or nuisance.

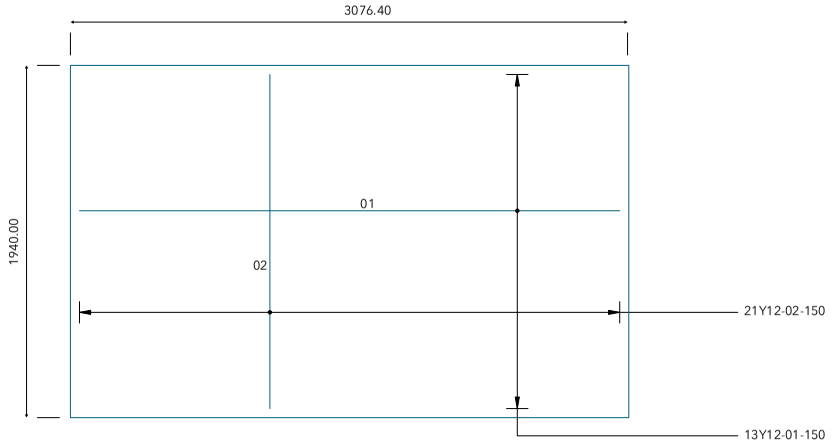
CITY OF CAPE TOWN Water and Sanitation G.Kaiser Executive Director: Water & Waste Directorate	project title STANDARD	drawing title REDUCED PRESSURE ZONE (RPZ) BACK-FLOW PREVENTER INSTALLATION	scale NTS	drawing no. W2-R-001-B	drawn EJB	designed EJB	date 07-03-19

20. ANNEXURE 4: STANDARD FOR REDUCED PRESSURE ZONE (RPZ) BACK-FLOW PREVENTER INSTALLATION (CONTINUED)

ROOF SLAB



FLOOR SLAB



SPECIFICATION

Roof slab = 200 mm thick
Walls = 220 mm thick
Floor slab = 200 mm thick
Concrete = 30 MPa
Cover = 50 mm
Plastic sheeting = 375 micron embossed
D.P.C. SABS 952/1962 Type B to be placed on all walls before roof slab is cast

BENDING SCHEDULE

	BAR MARK	TYPE SIZE	TOTAL NO.	SHAPE CODE	LENGTH
FLOOR SLAB	01	Y12	13	20	2976
	02	Y12	21	20	1840
ROOF SLAB	03	Y12	5	20	1640
	04	Y12	2	20	882
	05	Y12	12	20	2776
	06	Y12	6	20	1322
	07	Y12	6	20	1000

CITY OF CAPE TOWN
Water and Sanitation
G.Kaiser
Executive Director: Water & Waste Directorate

project title: STANDARD
drawing title: REDUCED PRESSURE ZONE (RPZ) BACK-FLOW PREVENTER INSTALLATION
scale: NTS
drawing no.: W2-R-001-A
drawn: EJB
designed: EJB
date: 07-03-19

THINK WATER
CARE A LITTLE. SAVE A LOT.

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- Online through our Service Requests tool at **www.capetown.gov.za/servicerequests**
- Email **water@capetown.gov.za**
- SMS **31373** (maximum of 160 characters)
- Call **0860 103 089** (choose option 2: water-related faults)
- Visit a City Walk-in-Centre, see **www.capetown.gov.za/facilities**

http://www.capetown.gov.za/thinkwater

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