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RAINWATER HARVESTING FOR RURAL AND URBAN HOUSING PROJECTS

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DEFINITIONS:

'Alternative water' refers to other sources of water that may minimize the use of municipal drinking water from dams. It includes greywater, rainwater, groundwater from boreholes, wellpoints or springs, surface water taken directly from streams/rivers and treated effluent.

'Climate change' is a long-term shift in global or regional climate patterns. Often climate change refers specifically to the rise in global temperatures from the mid-20th century to present. Climate change causes extreme weather events, flooding, droughts, an increase in the incidence and severity of wildfires and loss to human and animal life.

'Domestic water' is water used for indoor and outdoor household purposes: drinking, preparing food, bathing, washing clothes and dishes, watering the garden.

'Inert catchment' refers to the collection surface (roof) that does not have corosive properties when in contact with rainwater.

'Maintenance' refers to the act of keeping property or equipment in good condition by making repairs, correcting problems and identifying risks that require attention.

'Municipal by-law' is a legislation passed and enacted by a municipal council and gives effect to respective policies and is therefore the regulatory instrument through which a municipality exercises its authority.

'Non-potable' refers to water that is not suitable for drinking.

'Potable' refers to water that is suitable for drinking.

'Rainwater harvesting' is the collection and storage of rain water that runs off from roof tops, parks, roads, open grounds etc. which can be stored in a tank or recharged into the ground water.

'Rooftop rainwater harvesting' is the technique through which rain water is captured from the roof catchments and stored in storage tanks.

'Supplementary water use' refers to any water source that is available to a household to supplement potable supply from the water distribution system. The most common types include groundwater abstraction, rainwater harvesting and greywater reuse.

ABBREVIATIONS:

CSIR	-	COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH
DWS	-	DEPARTMENT OF WATER AND SANITATION
KZN	-	KWAZULU-NATAL
NBR	-	NATIONAL BUILDING REGULATIONS
NHBRC	-	NATIONAL HOME BUILDING REGISTRATION COUNCIL
RDP	-	RECONSTRUCTION AND DEVELOPMENT PROGRAMME
RPZ	-	REDUCED PRESSURE ZONE
RWH	-	RAINWATER HARVESTING
SABS	-	SOUTH AFRICAN BUREAU OF STANDARDS
SANS	-	SOUTH AFRICAN NATIONAL STANDARDS
VAT	-	VALUE ADDED TAX
WHO	-	WORLD HEALTH ORGANIZATION

SECTION 1

GENERAL INFORMATION & GUIDELINES

1.1 INTRODUCTION

In 2011, the KZN Department of Human Settlements issued an interim policy directive in relation to the installation of rainwater harvesting systems in rural housing projects. The lack of standards, designs and costings by regulatory bodies resulted in the policy directive being issued on an interim basis as a matter of urgency to help alleviate the water shortage problems experienced by poor rural communities in the province.

The interim policy directive inclusive of costings was developed through consultation with professionals from the built environment which remained provisional since implementation. At present, challenges with respect to the unaccounted inflationary increase in the cost of rainwater tanks and the associated installation has resulted in smaller tanks being installed to keep the costs within the maximum amounts provided.

Over time, the climatic and weather conditions have drastically changed on a national and provincial scale. Climate change-induced water scarcity has intensified in rural areas and is becoming more prevalent in urban and peri-urban areas in the province.

Therefore, the responsible use of alternative water sources such as RWH is important to minimise the use of municipal drinking water from dams, save money for consumers in the longer term, and increase water security as part of the provinces drive towards water resiliency. Rainwater harvesting should be considered an important element to augment water supply in both urban and rural areas, prevent flooding and alleviate the impact of climate change.

This revised policy directive does not have an official legal status, however it does point to the relevant legislation and regulations, as well as best practices to provide a more structured and informed guide to implement RWH in rural projects also expanding it to urban projects should funding become available at a later stage.

1.2 LEGAL FRAMEWORK

The South African water-related legislations do not provide an unambiguous framework for the adoption of RWH, however the relevant legislation and regulations provided below are applicable in this instance.

1.2.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (1996)

The Bill of Rights contained in the Constitution of the Republic of South Africa 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.

1.2.2 THE WATER SERVICES ACT (ACT 108 OF 1997)

The Water Services Act provides a framework for the provision of water supply and sanitation services to households in South Africa. The Water Services Act transfers the responsibility for the provision and management of existing domestic water supply and sewerage disposal systems from national to local government. The Water Services Act makes it illegal to install any plumbing component that does not comply with the relevant specifications listed in the latest versions of SANS 10106, 10252, and 10254. However, it does not make it mandatory for all components to bear the SABS mark.

1.2.3 THE NATIONAL WATER ACT (ACT 36 OF 1998)

The National Water Act (Act 36 of 1998) deals with the management and protection of water resources in the country. It 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. The 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.

1.2.4 THE MUNICIPAL SYSTEMS ACT (ACT 32 OF 2000)

The Municipal Systems Act (Act 32 of 2000) sets out legislation that provide the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities and ensure universal access to essential services that are affordable to all.

1.2.5 NATIONAL BUILDING REGULATIONS AND BUILDING STANDARDS ACT (ACT 103 OF 1977)

In terms of design and construction, RWH infrastructure must be consistent with the National Building Regulations (NBR) SANS 10400. The NBR fall under the National Building Regulations and Building Standards Act (Act 103 of 1977), which governs all building and construction work in South Africa.

1.2.6 NATIONAL STANDARDS

Other national standards that are directly applicable to alternative water installations (RWH) include the following:

a) SANS 1731:2017 water tanks must comply with the national tank standard for water tanks.
b) 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, backflow preventers and storage tanks.
c) SANS 1186-1:2015 for symbolic safety signs Part 1: Standard signs and general requirements.
d) SANS 1808-15:2011 for the water supply and distribution system components Part 15: Mechanical back-flow.
e) SANS 2001-CC2: 2007 for minor concrete works, such as a concrete base for a rainwater tank.

1.3 INSTITUTIONAL ARRANGEMENTS

The lack of a national umbrella body to coordinate RWH has resulted in institutions implementing rainwater harvesting systems through formal and informal arrangements. The following institutional arrangements have been implemented to provide guidance with respect to RWH.

1.3.1 THE RDP RURAL WATER SUPPLY DESIGN CRITERIA GUIDELINES (1997)

Specific Rainwater Harvesting guidelines relating to rural water supply are not readily available in South Africa. The more general guidelines relating to water supply must be considered. The RDP Rural Water Supply Design Criteria Guidelines published by Department: Water Affairs and Forestry in 1997 applies to alternative water supplies for rural areas.

1.3.2 THE NEIGHBOURHOOD PLANNING AND DESIGN GUIDE (RED BOOK): CREATING SUSTAINABLE HUMAN SETTLEMENTS (2019)

The Guidelines for Human Settlement Planning and Design, also known as the Red Book was initiated, coordinated and funded by the national Department of Human Settlements. The Council for Scientific and Industrial Research (CSIR) was responsible for the management of the development process and the preparation of the final document. The Red Book supports the development of sustainable human settlements by providing practical information related to the planning and design of the services and infrastructure typically provided as part of a neighbourhood development project. The guideline recommends that rainwater should be considered as a supplementary supply for non-potable use since it could pose a health risk.

1.3.3 DEPARTMENT OF WATER AND SANITATION: NATIONAL RAINWATER HARVESTING PROGRAMME

The DWS supports a national rainwater harvesting programme, which has a narrow but important focus on the construction of above and below-ground rainwater storage tanks by rural households for food gardens and other productive water uses. The programme targets rural communities through the installation of tanks and awareness creation sessions.

1.4 SUPPORTIVE FACTORS FOR RAINWATER HARVESTING IN KZN

The province receives most of its rainfall in the summer period, between October and March. The mean annual rainfall in KZN ranges from 650 mm and 1400 mm which is supportive of rainwater harvesting in the province for both urban and rural areas.

ADVANTAGES	DISADVANTAGES
Rainwater can be used for irrigation use, indoor non-potable water use, and/or potable water supply.	Unpredictable rainfall or little rainfall can limit the supply of rainwater collected.
Rainwater can be used as a supplementary source of water and reduce water bills for consumers.	There is an initial high cost for installation.
Reduces soil erosion in urban and rural areas.	Certain roof types may seep chemicals or animal droppings into the water storage tank that could pose a health risk.
In rural communities, women and children benefit from the saving in time spent collecting water.	There may be costs associated with regular maintenance.
Rainwater harvesting helps reduce utility usage during peak times (summer months) which saves treated water for more important and appropriate water uses.	
Reducing municipal water use for areas such as irrigation reduces the amount of water that a municipality has to treat and pump. This, in turn, reduces water service costs to a municipality.	
Rainwater harvesting can provide an independent water source in areas where other water sources are unavailable, where water quality is unacceptable, too expensive to develop, or too difficult to obtain.	
Rainwater harvesting systems can be employed as simple and effective methods to meet a municipality's stormwater management program requirements of individual properties.	

1.5. IMPLEMENTATION OF RAINWATER HARVESTING SYSTEMS (ROOFTOP) IN HOUSING PROJECTS

As per the National Housing Code, 2009, Technical and General Guidelines, Vol.2 Part 3:

"Rainwater harvesting is the process of intercepting storm-water runoff and putting it to beneficial use. Rainwater is usually collected or harvested from rooftops, concrete patios, driveways and other impervious surfaces. Buildings and landscapes can be designed to maximize the amount of catchment area, thereby increasing rainwater harvesting possibilities. Intercepted water then can be collected, detained, retained and routed for use in evaporative coolers, toilet flushing, pet and car washing, indoor plant watering, pet and livestock watering, and for lawn and garden irrigation."

1.5.1 COMPONENTS OF A ROOFTOP RAINWATER HARVESTING SYSTEM TO BE USED

Rooftop rainwater harvesting systems, both small and large systems are comprised of six basic components as described below:

a) Catchment area/roof: The surface upon which the rain falls; the roof has to be appropriately sloped preferably towards the direction of storage and recharge.
b) Gutters and Downspouts: The transport channels from catchment surface to storage; Gutters and/or Down pipes have to be designed depending on site, rainfall characteristics and roof characteristics.
c) Leaf screens/roof washers: Systems that remove contamination and debris.
d) Cisterns and storage tanks: Where collected rainwater is stored.
e) Conveying system (optional): The delivery system for treated rainwater, either by gravity or pump.
f) Water treatment (optional): Filters and equipment and additives to settle, filter and disinfect.

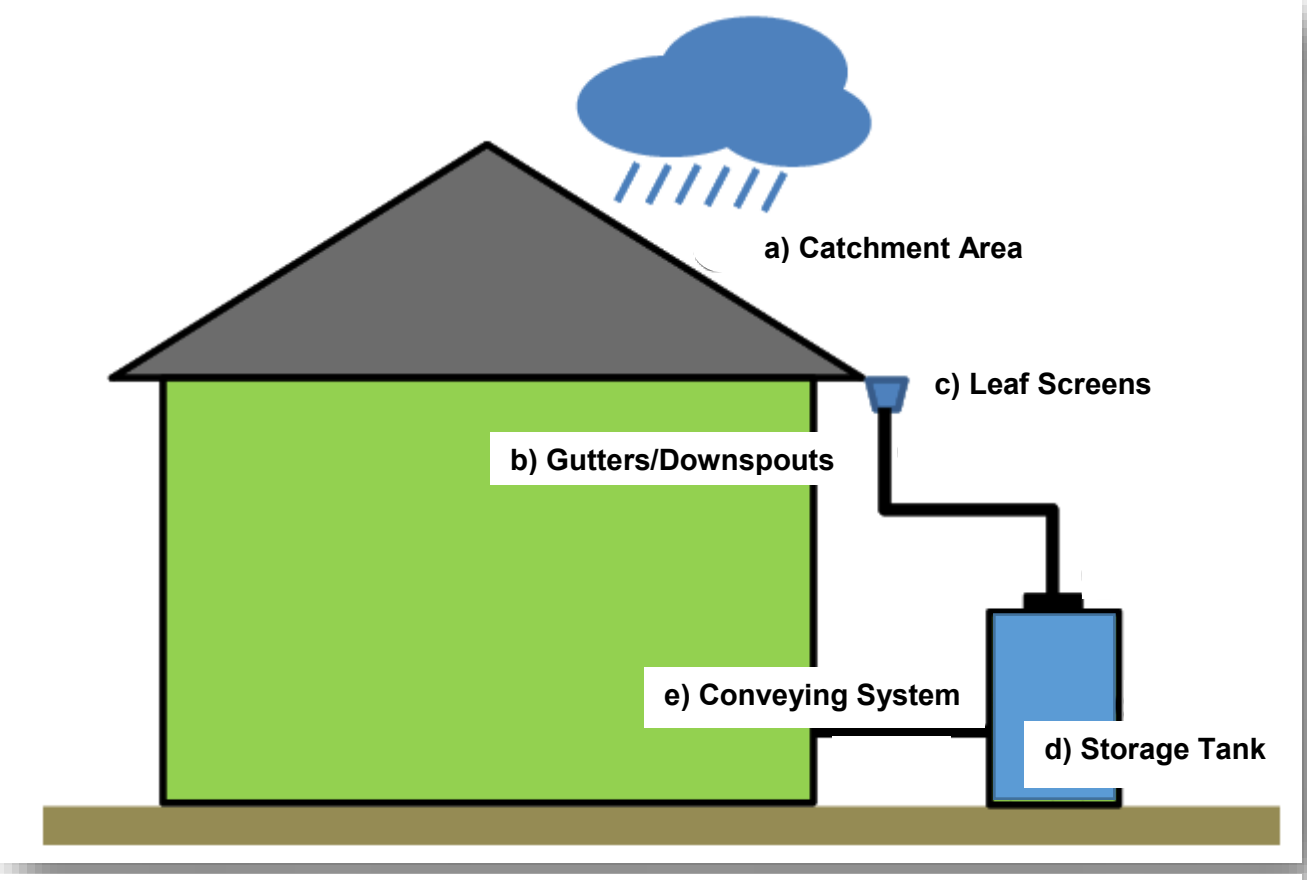

Figure 1: Components of a RWH system

1.5.2 INFLUENCING FACTORS

Among the several factors that influence the rainwater harvesting potential of a site, eco-climatic conditions and the catchment characteristics are considered to be the most important.

a) Rainfall Quantity: Rainfall is the most unpredictable variable in the calculation and hence, to determine the potential rainwater supply for a given catchment, reliable rainfall data are required for the specific area.
b) Rainfall Pattern: The number of annual rainy days also influences the need and design for rainwater harvesting. The fewer the annual rainy days or the longer the dry period, the need for rainwater collection in a region increases. However, if the dry period was too long, big storage tanks would be needed to store rainwater. Hence in such regions, it is more feasible to use rainwater to recharge ground water aquifers rather than for storage.
c) Rainfall intensity: The maximum intensity of rainfall will decide the peak flow which is to be harvested and depending upon the peak flow, the gutter size for sloping roof and diameter of drainage pipe has to be calculated.
d) Collection surface area: For rooftop rainwater harvesting, the collection area is restricted by the size of the roof of the dwelling unit. Sometimes other surfaces such as terrace, balconies and other projections are used to supplement the rooftop collection area.
e) Storage tank: The storage tank is usually the most expensive component of rainwater harvesting system. Hence a careful analysis is required for design of storage tank capacity.

1.6 DEPARTMENTAL REQUIREMENTS DURING THE INSTALLATION STAGES

1.6.1 PRE-INSTALLATION

1.6.1.1 Installation of a rainwater harvesting system does not require permission or licensing from DWS. However, a municipality may have by-laws pertaining to the installation of rainwater harvesting systems within its jurisdiction. Therefore, all relevant approvals must be sought during the pre-installation stage from a municipality if applicable. It is important to note that by-laws in each municipality may differ from one another.

1.6.1.2 For pre-existing developments, a site visit must be conducted to determine the rainwater harvesting potential of the house which can be done by assessing the rainfall in the local area as well as the roofing material.

1.6.1.3 For new developments, the catchment area (roof) material must be constructed from inert, non-toxic materials (preferably roof tiles/metal) to maximize the harvesting potential and reduce the risk of contamination.

1.6.1.4 The Climate Systems Analysis Group website, http://cip.csag.uct.ac.za/webclient2/waterharvest/ contains a useful rainwater harvesting tool. Municipalities and developers are encouraged to follow the steps to determine the rainwater harvesting potential of a property.

1.6.2 INSTALLATION

1.6.2.1 The correct rainwater system must be selected based on the water use needs of the end users. The DHS Red Book (2009) recommends that *"rainwater should only be considered as a supplementary supply for non-potable use since it could pose a health risk."* However, it has been considered for potable purposes in extreme instances in rural areas where water availability is a greater concern. In these cases, the rainwater harvesting specifications detailed in Section 2 of this directive shall apply in accordance with all national standards and municipal by-laws.

1.6.2.2 The installation of a rainwater harvesting system in urban areas shall only be used strictly as a supplementary source for non-potable purposes.

1.6.2.3 To help reduce the risk of poor or illegal installation, a registered, qualified and experienced service provider must be selected to undertake the installation of the RWH system as per the criteria detailed in paragraph 1.7.

1.6.2.4 It is pertinent that the Engineer/Designer for plumbing fittings understand all the various guidelines, policies, standards and best management practices for water supply systems design and plumbing.

1.6.2.5 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. All plumbing must be in accordance with SANS 10252-1:2016 (Edition 3.1).

1.6.2.6 Rainwater storage tanks must comply with SANS 1731:2017 and a concrete base (if applicable) must be built in accordance with SANS 2001-CC2: 2007.

1.6.2.7 The installation of a first flush diverter is mandatory in a rural housing project and optional in an urban housing project. The purpose of the first flush diverter is to act 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.

1.6.2.8 A mandatory coarse screen between the guttering and the delivery pipe must be included.

1.6.2.9 Signage indicating use of non-drinking water must be displayed at all times in accordance with SANS 1186-1:2015.

1.6.3 POST-INSTALLATION

1.6.3.1 End users must be made aware of the regular maintenance required to ensure optimum functionality and avoid health risks.

1.6.3.2 For rural housing projects, where rainwater is being used for potable purposes, end users must be educated on the most appropriate and inexpensive methods of treating rainwater for drinking purposes as indicated in Section 2 (post-installation and water treatment).

1.7 SUPPLIER SELECTION CRITERIA

1.7.1 Currently, there is no formal, accredited training in the installation of alternative water systems. Therefore, rainwater harvesting systems are currently being installed by qualified plumbers.

1.7.2 To reduce the risk of poor or illegal installations, the following criteria must be met:

a) The qualified plumber must have the necessary qualifications and be registered with the relevant professional body.
b) The installer or plumber must have a proven track record with the kind of system required.
c) The level of experience of the installer must be determined by obtaining contactable references to ensure that the installer is competent and sufficiently skilled.
d) The installer must be able highlight the pros and cons of the systems being installed and provide professional advice in terms of each context or need.
e) The installer must agree to comply with SANS standards, national legislation and by-laws relating to the rainwater harvesting system being considered.

1.8 IMPLICATIONS

1.8.1 Untreated/unfiltered rainwater poses a potential health risk to consumers. In view of this, end users/beneficiaries are to give written acknowledgement that harvested rainwater is to be used for non-potable purposes only and if used for potable purposes the Department will not be held liable for any losses or damages incurred **(Annexure A)**.

1.8.2 The Department will not be held liable for any costs incurred for the distribution of rainwater for indoor use (through a pump) or the maintenance of the rainwater harvesting system once installation is complete. This will be the responsibility of the end user/beneficiary.

SECTION 2

RAINWATER HARVESTING SYSTEMS FOR RURAL HOUSING PROJECTS

2.1 PREAMBLE

Many impoverished rural communities in KwaZulu-Natal experience continuous climate change-induced water scarcity for prolonged periods of time. The implementation of the KZN RWH interim policy directive in 2011 has provided a response mechanism to help alleviate water insecurity issues experienced in these rural areas.

Rainwater in rural areas is often used as a sole source of water supply rather than a supplementary source and has been used for both potable and non-potable purposes. As per section 1, the use of rainwater for potable purposes i.e., drinking and cooking is strongly discouraged, however it has been used in extreme instances where water availability is a bigger issue than water quality. In such cases, strict protocols and preventative measures have to be applied to minimize the potential health risks for end users.

Specific Rainwater Harvesting guidelines relating to rural water supply are not readily available in South Africa in which case the more general guidelines relating to water supply must be considered. The RDP Rural Water Supply Design Criteria Guidelines published by the Department of Water Affairs and Forestry (1997) applies. Despite the lack of a clear-cut legal framework, the revised specifications, cost and other important considerations detailed hereto shall apply in the instance of installing a rainwater harvesting system in a rural housing project.

2.2 RWH SPECIFICATIONS FOR RURAL HOUSING

2.2.1 As per the National Housing Code, Volume 2: Technical guidelines, it is pertinent that the Engineer/Designer for plumbing fittings understand all the various guidelines, policies, standards and best management practices for water supply systems design and plumbing. The following may be used as a guide when installing a rainwater harvesting system in a rural housing project:

2.2.1.1 Catchment area

a) Rainwater collection surfaces (roofing) in rural housing projects should be constructed from inert, non-toxic materials like cement, corrugated and galvanised iron.
b) Overhanging trees/branches/vegetation must be removed.

2.2.1.2 Conveyance

a) All plumbing fittings including gutters, downspouts and piping to be in accordance with SANS 10252-1:2016 (Edition 3.1).
b) A mandatory coarse screen between the guttering and the delivery pipe must be included (wire mesh) in order to prevent the ingress of large foreign bodies, such as leaves.
c) Installation of a rainwater harvesting system for outdoor use only requires installation of a standard brass tap on the storage tank. It is recommended that a ‘demand’ tap be installed to prevent wastage.

2.2.1.3 Storage tank

a) A minimum tank size of 2500L must be installed in a rural housing project.
b) Water tanks must comply with SANS 1731:2017 which is the national tank standard for water tanks. It is not compulsory for water storage tanks to be SABS approved but must comply with SANS 1731:2017.
c) Tanks must be UV resistant to prevent algae growth.

d) Adequate covering must be used to prevent influence from direct sunlight, human, animal and organic matter from entering the storage system and mosquito breeding. A fine screen between the delivery pipe and the tank and at all openings to the tank will prevent access by insects and rodents.
e) In accordance with SANS 1186-1:2015 for symbolic safety signs, signage must be attached to the rainwater tank to make consumers aware on the danger of drinking untreated rainwater **(Annexure B)**.

2.2.1.4 Filtration system

a) A mandatory 'first flush' system may be installed to remove as much contamination as possible before the storage tank starts to fill. 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. If considered, the first-flush diverter must be empty when rainfall starts, and consumers must be encouraged to inspect it frequently.

2.2.1.5 Post-installation water treatment and maintenance

The following water treatment methods are to be communicated to end users/beneficiaries if water is used for potable purposes from RWH tanks in rural communities once installation is complete:

a) For drinking purposes water must be boiled to kill any harmful bacteria, viruses or protozoa (WHO, 2003). The water can then be cooled and stored in a clean container until use. To improve the taste of boiled water, it must be poured back and forth from one clean container to another, or it should be left to stand for a few hours to increase the dissolved oxygen concentration.
b) Periodic inspection of the RWH system is imperative to preserve quality, reduce contamination and ensure full use of the system. It does not require skilled labour. Cleaning of catchment areas before the start of every rainy season should be a normal practice. Also, annual inspection and cleaning of the storage tank, gutters, down-pipes and filters (3 to 6 months) is sufficient.

2.3 COST CONSIDERATIONS

2.3.1 The rainwater storage tank usually represents the biggest capital investment element of a small-scale rooftop rural rainwater harvesting system and therefore require careful design to provide optimal storage capacity while keeping the cost as low as possible.

2.3.2 Estimates of the cost of installing a complete rainwater harvesting system with installation is approximately R10,430.00 (including VAT) for a 2500L tank. The amount of R10,430.00 is based on revised calculations obtained from RWH service providers/installers **(Annexure C)**.

2.3.3 An all-inclusive maximum amount of R10,430.00 is recommended for a maximum 2500L tank, with all fittings and plinth, subject to NHBRC and municipal approved plans/drawings/specifications, and final costs, post NHBRC approval.

2.3.4 Departmental quantity surveyors are to give final confirmation prior to any agreement of instruction of works.

2.4 IMPORTANT CONSIDERATIONS

2.4.1 All relevant approvals must be sought during the pre-installation stage from a municipality if applicable.

2.4.2 Advents of new rainwater harvesting technology may be considered subject to SANS accreditation and NHBRC/municipal approval. Market research has shown that advents of new

RWH technology are offering improvements over conventional systems in that they fulfil all functionalities, namely: collection, filtration, disinfection, storage and distribution in one aesthetically pleasing solution. There are also more user-friendly systems designed as a fit-and-forget solution, requiring minimal maintenance.

2.4.3 Installations must be done by a qualified plumber who is registered with a professional body. In addition, there must be a proven track record and experience as well as adherence to standards and by-laws.

SECTION 3

RAINWATER HARVESTING SYSTEMS FOR URBAN HOUSING PROJECTS

3.1 PREAMBLE

Growing water scarcity, climate change, rapid urbanisation, and increased demand for water, make rainwater harvesting a viable option for cities. RWH that is used as a non-potable supplementary source of water in urban areas has the potential to reduce municipal water consumption, alleviate storm water runoff, reduce pressure on the state to meet water demands as well as offer a range of economic and environmental benefits. However, a lack of funding to include RWH in urban housing projects continues to restrict its inclusion in housing projects. Government is currently exploring ways to access funding to improve water management in cities. Despite the lack of funding at this current stage, should funding become available the following specifications, cost and other important considerations detailed hereto shall apply when installing a rainwater harvesting system in an urban environment.

As per the national legislation set out in Section 1, Rainwater harvesting in urban areas is to be strictly used as an alternative non-potable water source ONLY.

The KZN Department of Human Settlements strongly discourages the use of rainwater for potable/domestic purposes. The use of alternative water occurs entirely at consumers' own risk. The Department is not liable for any consequential damage or loss arising directly or indirectly from such water use.

3.2 RWH SPECIFICATIONS FOR URBAN HOUSING

3.2.1 Selecting the most appropriate type of rainwater harvesting system in an urban area, will depend on the housing typology (free-standing units, row houses, high-density) and the intended water use (indoor/outdoor/both) which must be determined during the planning stage of the project. Refer to paragraph 3.2.4.3 below for further specifications.

3.2.2 Rainwater harvesting in urban areas is to be strictly used as an alternative non-potable source of water ONLY.

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

a) toilet flushing;
b) cleaning vehicles, bins and outdoor surfaces; and
c) Irrigation – limited depending on restrictions in place at the time.

3.2.4 As per the National Housing Code, Volume 2: Technical guidelines, it is pertinent that the Engineer/Designer for plumbing fittings understand all the various guidelines, policies, standards and best management practices for water supply systems design and plumbing. The following may be used as a guide when installing a rainwater harvesting system in an urban housing project:

3.2.4.1 Catchment area

a) Rainwater collection surfaces (roofing) in urban housing projects should be constructed from inert, non-toxic materials preferably cement roof tiles.
b) Overhanging trees/branches/vegetation must be removed.

3.2.4.2 Conveyance

a) All plumbing fittings including gutters, downspouts and piping to be in accordance with SANS 10252-1:2016 (Edition 3.1).

b) A mandatory coarse screen between the guttering and the delivery pipe must be included (wire mesh) in order to prevent the ingress of large foreign bodies, such as leaves.
c) If rainwater is to be used for indoor purposes, it is mandatory that a Reduced Pressure Zone (RPZ) valve back flow preventer is fitted into the municipal drinking water supply plumbing in a property to avoid possible contamination of municipal treated water. When installed, the RPZ must be in accordance with SANS 10252-1:2016 (Edition 3.1).
d) If rainwater is to be used solely for outdoor purposes, the RPZ is not mandatory. 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.
e) Installation of a rainwater harvesting system for outdoor use only requires installation of a standard brass tap on the storage tank. It is recommended that a 'demand' tap be installed to prevent wastage.

3.2.4.3 Storage tank

a) A minimum tank size of 1000L per household must be installed in an urban housing project. The following storage options may be considered depending on the type of housing project developed:

House typology	Type of RWH system
Free-standing	1000L Individual/slim-line tank
Row houses	10 000L Bulk tank (1000L per household)
High-density	10 000L Bulk tank (1000L per household)

b) Individual 1000L tanks may be considered for free-standing units or row houses.
c) Bulk 10 000L tanks may be considered for row houses or high-density buildings that links to each household (10 households per 10 000L tank).
d) Water tanks must comply with SANS 1731:2017 which is the national tank standard for water tanks. It is not compulsory for water storage tanks to be SABS approved but must comply with SANS 1731:2017.
e) Tanks must be UV resistant to prevent algae growth.
f) Adequate covering must be used to prevent influence from direct sunlight, human, animal and organic matter from entering the storage system and mosquito breeding. A fine screen between the delivery pipe and the tank and at all openings to the tank will prevent access by insects and rodents.
g) In accordance with SANS 1186-1:2015 for symbolic safety signs, signage must be attached to the rainwater tank to make consumers aware on the danger of drinking untreated rainwater (Annexure B).

3.2.4.4 Filtration system

a) An optional 'first flush' system may be incorporated into the rainwater collection system for an urban housing project, to remove as much contamination as possible before the storage tank starts to fill.

3.2.4.5 Post-installation maintenance

a) End users must be informed about the necessary periodic inspections of the RWH system that need to be taken to preserve quality, reduce contamination and ensure full use of the system. It does not require skilled labour. Cleaning of catchment areas before the start of every rainy season should be a normal practice. Also, annual inspection and cleaning of the storage tank, gutters, down-pipes and filters (3 to 6 months) is sufficient.

3.3 COST CONSIDERATIONS

3.3.1 Currently, the KZN Department of Human Settlements does not have a funding option available that may be used to implement rainwater harvesting systems in urban housing projects. However, this serves as a guideline to be used if funding is made available.

3.3.2 The estimated cost of installing an individual rainwater harvesting system with a minimum 1000L tank ranges from R6500 to R8000 (incl. VAT) for conventional and new systems (Annexure D).

3.3.3 The estimated cost of installing a bulk rainwater harvesting system suitable for row houses and high-density houses starts from R10 000 for a 10 000L tank connected individually per household (1000L per household).

3.3.4 To a certain extent, a degree of variation is to be expected, as a range of factors may influence costs. These factors include:

a) Whether installation is part of new construction or is a retrofit to an existing dwelling.
b) Number of people in a household.
c) Uses of the rainwater (indoor/outdoor)

3.4 IMPORTANT CONSIDERATIONS

3.4.1 All relevant approvals must be sought during the pre-installation stage from a municipality if applicable.

3.4.2 Advents of new rainwater harvesting technology may be considered subject to SANS accreditation and NHBRC/municipal approval. Market research has shown that advents of new RWH technology are offering improvements over conventional systems in that they fulfil all functionalities, namely: collection, filtration, disinfection, storage and distribution in one aesthetically pleasing solution. There are also more user-friendly systems designed as a fit-and-forget solution, requiring minimal maintenance.

3.4.3 Installations must be done by a qualified plumber who is registered with a professional body. In addition, there must be a proven track record and experience as well as adherence to standards and by-laws.

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ANNEXURE A: DISCLAIMER / ACKNOWLEDGEMENT LETTER TEMPLATE

KWAZULU-NATAL PROVINCE
HUMAN SETTLEMENTS
REPUBLIC OF SOUTH AFRICA

Private Bag X54367, DURBAN, 4000
Eagle Building, 353-363 Dr Pixley kaSeme Street, Durban, 4001
Tel: 031 336 5300

OFFICE OF THE HOD

PROJECT NAME		**BENEFICIARY ID NO.**	
PROJECT NO.		**BENEFICIARY NAME**	

To whom this letter may concern,

This letter serves to inform you, the beneficiary that the rainwater harvesting system installed on your property should only be considered as a supplementary supply for non-potable (non-drinking) use since it could pose a health risk.

You are advised to seek professional advice from an accredited service provider should you wish to use the harvested rainwater for potable purposes.

The Department will not be held liable for any costs incurred for the distribution of rainwater for indoor use (through a pump) or the maintenance of the rainwater harvesting system once installation is complete. This will be the responsibility of the end user/beneficiary.

The Department is not liable for any consequential damage or loss arising directly or indirectly from such water use.

THUMB PRINT

Signature: _____ **Date: _____**

ISITHASISELO A: INSUSELAKUYO YENCWADI YOKUZIHLANGULA/ YOKUVUMA

KWAZULU-NATAL PROVINCE
HUMAN SETTLEMENTS
REPUBLIC OF SOUTH AFRICA

IHHOVISI LENHLOKO YOMNYANGO

Eagle Building, 353-363 Dr Pixley kaSeme Street, Durban, 4001

Ucingo: 031 336 5300

IGAMA LOMKLAMO		**INOMBOLO KAMAZISI YALOWO OHLOMULAYO**	
INOMBOLO YOMKLAMO		**IGAMA LALOWO OHLOMULAYO**	

Kubhekiswe kulowo eqondene naye

Le ncwadi iyakwazisa wena ohlomulayo ukuthi uhlelo lokudonswa kwamanzi emvula olufakwe endaweni yakho kumele luthathwe ngokuthi lungelokwengeza ukuphakelwa kwamanzi okungewona awokuphuzwa (angaphuzwa) njengalokhu ukuphuza lawa manzi kungabeka impilo engcupheni.

Uyelulekwa ukuba ufune iseluleko sikangoti kumhlinzekimsebenzi ogunyaziwe uma ufisa ukusebenzisa lawa manzi emvula ngenhloso yokuwaphuza.

Umnyango angeke uthweswe icala lanoma yiziphi izindleko ezidaleke ngenkathi kusatshalaliswa amanzi emvula ngamapayipi ngenhloso yokuwasebenzisa ezindlini (ngamaphampu) noma ukunakekelwa kohlelo lokudonswa kwamanzi emvula emva kokuba sekuphothuliwe ukufakwa kwalo. Lokhu kuyokuba ngumthwalo walowo ozowasebenzisa/ lowo ohlomulayo.

Umnyango awunasibopho sanoma yimuphi umonakalo kumbe ukulahlekelwa okuyovela ngqo noma ngenye indlela ngenxa yalokhu kusetshenziswa kwamanzi.

UKUCINDEZELA ISITHUPHA

Isignesha: _____ **Usuku: _____**

ANNEXURE B: OFFICIAL SIGNAGE FOR DISPLAY ON RAINWATER STORAGE TANK (SANS 1186-1:2015 for symbolic safety signs Part 1: Standard signs and general requirements

KWAZULU-NATAL PROVINCE

HUMAN SETTLEMENTS
REPUBLIC OF SOUTH AFRICA

NON-DRINKING WATER IN USE

DO NOT DRINK!

KUSETSHENZISWE AMANZI ANGAKULUNGELE UKUPHUZWA

UNGALOKOTHI UWAPHUZE!

ANNEXURE C: COST BREAKDOWN OF RAINWATER HARVESTING SYSTEM FOR RURAL HOUSING PROJECTS

NEW SPECIFICATION (2023)

Description	Qty	Price (incl.vat)
2500 litre vertical plastic tank	1	**R4,050**
First flush diverter	1	**R530.00**
Concrete base 2500L	1	**R2,500.00**
Pipework/fittings	1	**R800.00**
Labour	1	**R2,500.00**
Signage	1	**R50.00**
	TOTAL COST	**R10,430.00**

OLD SPECIFICATIONS (2011)

Description	Qty	Price (incl.vat)
Foundations	1	**R1,438.51**
Carpentry & Joinery	1	**R1,040.00**
Plumbing & Drainage	1	**R4,382.00**
Paintwork	1	**R90.00**
	TOTAL COST	**R6,950.51**

ANNEXURE D: COST BREAKDOWN OF RAINWATER HARVESTING SYSTEM FOR URBAN HOUSING PROJECT

Table 1: Costing of a conventional RWH system

Description	Qty	Price (incl.vat)
1000 litre vertical plastic tank	1	R2,044.00
Concrete base 1000L	1	R1,500.00
Pipework/fittings	1	R800.00
Labour	1	R2,500.00
Signage	1	R50.00
	TOTAL COST	R6,894.00

Table 2: Costing of a newly introduced RWH system

Per Household			
Product Description	Quantity	Unit Price	Total
Rainwater Distribution Module (RDM)	1	R899,00	R899,00
Harvester Tank (60/)	1	R1 699,00	R1 699,00
6m PVC Piping	1	R132,00	R132,00
T-piece pipe	2	R20,00	R40,00
Quick connect	1	R20,00	R20,00
90° bend	1	R15,00	R15,00
Miscellaneous Consumables		R250,00	R250,00
		Subtotal	R3 055,00
Labour cost-installation	1	R1 050,00	R1 050,00
Bulk Tank- 10 000 l (2 x 5000l tanks)	1	R10 000,00	
1000 l per household	1	R1 000,00	R1 000,00
		Subtotal	R5 105,00
		VAT (15%)	R765,75
		Total with Bulk Tank and installation per household	R5 870,75