

DEPARTMENT OF WATER AND SANITATION

NO. 982

08 SEPTEMBER 2017

NATIONAL NORMS AND STANDARDS FOR DOMESTIC WATER AND SANITATION SERVICES

Version 3- Final

Acknowledgement

This document was prepared by the CSIR Built Environment team consisting of Louiza Duncker (project leader), Dr Philip R Page, Esther Ngorima, Bongi Maposa and S'bonelo Zulu.

The CSIR team is grateful for the support from the project team of the Department of Water and Sanitation (DWS): Regulation and Compliance (Mr Patrick Ntabeni, Mr Bekhubuhle Mbentse, Mr Siboniso Ndlovu and Mrs Julia Kekana) for the section on water norms and standards, and Mr Siboniso Ndlovu, Mr Bekhubuhle Mbentse, Mrs Julia Kekana and Mrs Norma Lerobane for the section on sanitation norms and standards.

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List of abbreviations

AMI	Advanced metering infrastructure
AMM	Automated meter management
AMM-IM	Automated meter management with interval metering
AMR	Automated meter reading
CBO	Community-based organisation
CoGTA	Department of Cooperative Government and Traditional Affairs
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DMWS	Durban Metro Water Services
DPW	Department of Public Works
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
dplg	Department of Provincial and Local Government
e.g.	for example
EHPs	Environmental Health Practitioners
EWR	Environmental Water Requirements
FBS	Free Basic Services
FBSan	Free Basic Sanitation
IAM	Infrastructure Asset Management
i.e.	that is
IBT	Increasing Block Tariff
IWRM	Integrated Water Resource Management
JMP	Joint Monitoring Programme
k	kilo (a thousand of a quantity)
kPa	Kilo Pascal
L	Litre
L/c/d	litre/capita/day
L/p/d	litre/person/day
LES	Local Equitable Share
LGES	Local Government Equitable Share
LOFLOS	low flow on-site sanitation systems
m	metre
MDGs	Millennium Development Goals
MIG	Municipal Infrastructure Grant
MUS	Multiple Use Services
NBR	National Building Regulations
NDP	National Development Plan
NEMA	National Environmental Management Act
NGO	Non-Governmental Organisation
NPC	National Planning Commission
NSPU	National Sanitation Programme Unit
NWA	National Water Act, No 36 of 1998
NWPR	National Water Policy Review
NWRS	National Water Resources Strategy
NWRS2	Second National Water Resources Strategy
NWSA	National Water Services Act, No 108 of 1997
OD	Open defecation

OHSA	Occupational Health and Safety Act, No 85 of 1993
O&M	Operation and Maintenance
PPM	Pre-payment meter
RDP	Reconstruction and Development Program
RPMS	Regulatory Performance Measurement System
SABS	South African Bureau of Standards
SALGA	South African Local Government Association
SANS	South African National Standards
SDEP	Sewage Disposal Education Programme
SDGs	Sustainable Development Goals
SFWS	Strategic Framework for Water Services
StatSA	Statistics South Africa
STED	septic tank effluent drainage
UD	Urine Diversion
UN	United Nations
UNEP	United Nations Environmental Programme
UNICEF	United Nations Children Education Fund
VIP	Ventilated Improved Pit
W ₂ RAP	Wastewater Risk Abatement Plan
WARS	Strategy for Water Allocation Reforms
WC	Water conservation
WCDM	Water Conservation and Demand Management
WCP	Water Conservation Plan
WDM	Water demand management
WEDC	Water Engineering for Developing Countries
WHO	World Health Organisation
WRC	Water Research Commission
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSP	Water Services Provider
WWTW	Wastewater treatment works

Preamble

The current norms and standards for water and sanitation have, over the last few decades, inadvertently focused on addressing water services and backlogs in urban areas, unintentionally overlooking the diverse variances and challenges prevalent in the rural areas. Consequently, local government structures are dealing with a range of approaches to water service provision that span both urban and rural areas, which are often based on the allocation of powers and functions between district municipalities and local municipalities, thus creating confusion and misalignment in the provision of services.

The Water Services Act (WSA) 108 of 1997 mandates the Minister responsible for water and sanitation to prescribe compulsory national norms and standards in accordance with Sections 9 and 10 of the Act. These norms and standards are fluid and may be reviewed for the benefit of the population of South Africa. The National Water Policy Review (NWPR) resulted in the prioritisation of access to basic water supply in the form of a yard tap to all households in the country, and the 2016 Sanitation Policy refers to at least a Ventilated Improved Pit (VIP) toilet per household for basic sanitation.

The Minister responsible for water and sanitation has been called upon to develop norms and standards for equitable water services provision to households, which are aligned with the Strategic Framework for Water Services (SFWS), taking into account availability of water resources, financial challenges, geographical placement issues, servicing of vulnerable groups and addressing the backlog.

This document is the culmination of the review and revision of the international and national norms and standards for water and sanitation services. It sets out and describes the national norms and standards for levels of water services, including sanitation, which will be applicable from 2017 onwards, until the Minister requests another revision in future.

After the introduction and definitions, the first part of the document (Part One) focuses on water components of water services and the second part of the document (Part Two) focuses on the sanitation and waste water components of water services. Part Three summarises the monitoring and reporting responsibilities and Part 4 conclude with a proposed plan of action in implementing the norms and standards for water and sanitation services.

Annexure A summarises the legislation impacting on water and sanitation services, Annexure B list the policies and strategies, and Annexure C provides a list of current guidelines and standards pertaining to water and sanitation services.

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Introduction

1. Introduction

The legislation that regulates domestic water and sanitation services in South Africa, irrespective of whether the service is provided to a household, school, student residence, clinic, hospital or community site, are the Water Services Act (WSA, Act No. 108 of 1997) and the National Water Act (NWA, Act No. 36 of 1998) (South Africa, 1997; 1998b). Both of these acts fall under the ambit of the Minister of Water and Sanitation, and are thus regulated by the Department of Water and Sanitation (DWS). The Minister's mandated functions in the domestic water use sector, according to these acts, are to establish, monitor and regulate guidelines to address national water and sanitation policies, the setting of criteria to guide subsidies, to provide minimum standards for water and sanitation services, and to monitor and regulate service provision.

Actual delivery of the water and sanitation services, in accordance with the Constitution, is the responsibility of local government. According to the Strategic Framework for Water Services (SFWS) (DWAF, 2003), it is the responsibility of a Water Services Authority (WSA) to ensure that "*adequate and appropriate investments are made to ensure the progressive realisation of the right of all people in its area of jurisdiction to receive at least a basic level of water and sanitation services*"; i.e. a universal service obligation (DWAF, 2003). Meeting this universal service obligation requires that each South African has access to at least a basic water supply and a basic sanitation facility.

A number of South African policies, legislation and regulations have direct implications for the provision of water and sanitation services to all people in South Africa, or govern and inform the provision of water and sanitation services. See Annexure A for a summary of these policies, legislation and regulations.

The norms and standards for levels of water services particularly draw on the principles of universal access, human dignity, user participation, service standards, redress, and value for money. The principles of sustainability, affordability, effectiveness, efficiency and appropriateness should be kept uppermost in supplying water to a community.

Cognisance is taken of the water scarcity context of the country, and as such reduction, re-use and recycling are common themes that underpin the norms and standards. The effectiveness of the services towards the protection of public health and the greater economic development agenda of the country also receives firm attention. See Annexure B for a summary of the principles underpinning the norms and standards for water and sanitation services.

Definitions

2. Definition and description of terms used

Terms used in this document are defined and described below.

Term	Definition
Adequate sanitation facility	A facility that effectively separates excreta from human contact, and ensures that the excreta do not re-enter the immediate environment or pose any risk to the humans or the environment.
Appropriate sanitation service	An appropriate sanitation service is one that effectively protects and preserves public health and the natural environment whilst being acceptable, affordable, manageable and adaptable in responding to the demand, the socio-cultural needs, the users' ability to afford continued operation, and the available organisational/institutional and technical capacities.
Appropriate technology	<i>Appropriate technology refers to conventional, alternative and intermediate infrastructure/ device, tools and processes that are suited to the specific time and place, and which meet context-specific criteria and key characteristics.</i> This means the sustainable application or operation of a technology (process, tool and/or device) to meet national imperatives within the local institutional, financial, social, cultural, ethical, economic and environmental requirements and constraints experienced by the authority or consumer responsible for the technology.
Basic sanitation	The minimum acceptable level of sanitation, as described in the 2016 National Sanitation Policy: <ol style="list-style-type: none"> a) <i>“appropriate health and hygiene awareness and behaviour;</i> b) <i>the lowest cost, appropriate system for disposing of human excreta, household waste water, grey water, which considers resource constraints, is acceptable and affordable to the users, safe including for children, hygienic and easily accessible and which does not have a detrimental impact on the environment; and</i> c) <i>a toilet and hand washing facility for each household.</i> d) ensures clean living environment at a household and neighbourhood levels e) including supervision of/ assistance with defecation practices of small children and people with disabilities and special needs”.
Basic sanitation facility	A basic sanitation facility is as defined by the National Sanitation Policy (DWS, 2016) as follows: <p><i>“The infrastructure which considers natural (water; land; topography) resource protection, is safe (including for children), reliable, private, socially acceptable, skilled and capacity available locally for operation and maintenance , protected from the weather and ventilated, keeps smells to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests, facilitates hand washing and enables safe and appropriate treatment and/or removal of human waste and wastewater in an environmentally sound manner”.</i></p>
Basic sanitation services	As per the 2016 National Sanitation Policy, a basic sanitation service is <i>“the provision of a basic sanitation facility which is environmentally sustainable, easily accessible to a household and a consumer, the sustainable operation and maintenance of the facility, including the safe removal of human waste, grey-water and wastewater from the premises where this is appropriate and necessary, and the communication and local monitoring of good sanitation, hygiene and related practices”.</i>
Basic water supply	A basic water supply is defined as a minimum volume of potable water to a formal connection at the boundary of a stand or site of a public institution (school, clinic, hospital

	etc.) as prescribed by the Minister responsible for water supply.
Basic water supply facility	A basic water supply facility is defined as the infrastructure necessary to supply potable water to a formal connection at the boundary of a stand or site of a public institution (school, clinic, hospital etc.).
Basic water supply service	A basic water supply is <i>the provision of a basic water supply facility, the sustainable operation of the facility (available for at least 350 days per year and not interrupted for more than 48 consecutive hours per incident) and the communication of good water-use, hygiene and related practices</i> ".
Effluent	Effluent, is as defined in the Regulations relating to Compulsory National Standards and Measures to Conserve Water (DWAF, 2001a) <i>'human excreta, domestic sludge, domestic waste-water, greywater or waste water resulting from the commercial or industrial use of water.'</i>
Free basic sanitation	As per the 2016 National Sanitation Policy, a free basic sanitation service is <i>"affordable ongoing services to at least the basic level of sanitation for indigent households"</i> .
Free basic water supply	Free basic water supply is affordable ongoing services to at least the basic volume of water for indigent households, i.e.the provision of a minimum of 25 litres of potable water per person per day, or as prescribed by the Minister responsible for water supply.
Greywater	Greywater is defined as water from baths, showers and hand basins. Wastewater from kitchen sinks, dishwashers and washing machines (except if environmentally friendly detergents are used) is excluded due to its high solids content and the negative impact of softeners and other undesirable chemicals on the environment. Greywater is different from reclaimed water, reclaimed water is wastewater (including black water) that has been treated by a centralised wastewater treatment plant for potable or non-potable re-use.
Handwashing	Handwashing shall be taken to be the appropriate technique involving the use of water and soap, ash, or other detergent with the required amount of scrubbing of all hand surfaces and finger nails and rinsing with clean water.
Household	The StatSA defines 'household' as <i>"a group of people who live together at least four nights a week, eat together and share resources, or a single person who lives alone"</i> (http://www.statssa.gov.za/?page_id=734).
Hygiene	Hygiene is defined in the 2016 National Sanitation Policy as <i>"Personal and household practices that serve to prevent infection and keep people and environments clean, and the conditions and practices that help to maintain health and prevent the spread of diseases"</i> . Hygiene promotion is <i>"systematic approaches to encourage the widespread adoption of safe hygiene practices in order to reduce diarrhoeal and other water- and sanitation-related diseases by focusing on determinants of behaviour change, which may not necessarily be directly related to knowledge of the health consequences of poor hygiene"</i> . Hygiene education <i>"relates to all activities that aim to increase an individual's knowledge about issues relating to personal habits and practices that affect one's health, particularly in relation to water and sanitation services. Hygiene education includes personal hygiene, water hygiene, food hygiene, human waste hygiene and environmental hygiene education to ensure appropriate sanitation practices for the protection of human waste"</i> .
Improved sanitation facility	A sanitation that is meets the basic requirements. All facilities not meeting this requirement, are taken as unimproved. Notwithstanding this, pit toilets without a slab or platform or vent pipe, bucket toilets, chemical toilets (unless used in an temporary or emergency situation), and open defecation in fields, forests, bushes, beaches, bodies of water, or with solid waste are unimproved facilities.
Indigent	The definition of indigent is thus: <i>people living in one household who collectively earn less than R1600 per month and who have registered the household as indigent with the relevant water services provider(WSP)</i> . It is the responsibility of the WSP to re-evaluate the status of indigent households on a regular basis to ensure integrated water demand management.

Infrastructure Asset Management	The process of guiding the acquisition, use, safeguarding and disposal of assets to maximise their service delivery potential. It encompasses the administration, documentation, control, financial, engineering, economic and social practices and techniques that are applied throughout the life cycle of an asset.
Menstrual hygiene	This shall be interpreted as the implements (including sanitation materials, soap and adequate clean water) and practices that will allow girls and women to manage the menstrual bleeding with privacy, comfort and dignity.
Norms and standards	As previously defined in the DWS 'Norms and standards for tariffs' (DWS, 2015), these are <i>'the required behaviour that should not be deviated from, whether quantitative or qualitative, or average, or minimum or maximum.'</i>
Operation and maintenance	<i>Operation</i> refers to the direct access to the sanitation facility by the user (e.g. operating the <i>toilet</i>), to the activities of any operational staff (e.g. operators of motorised suction pumps), and to the rules or by-laws, which may be devised to govern who may access the system, when, and under what conditions. <i>Maintenance</i> is about the technical activities, planned or reactive, which are needed to keep the system working and the service sustainable.
Potable water	Potable water is defined as: water that is safe to be consumed or used by humans with a no, or low, risk of immediate or long term harm.
Safe management of excreta	The containment, extraction, and transport of excreta to a designated disposal or treatment site, or its hygienic re-use to ensure that it (excreta) poses no risk to human health or the natural environment.
Sanitation	As defined by the 2016 National Sanitation Policy, it is <i>"the principles and practices relating to the collection, removal or disposal of human excreta and household, public institution, industrial, agricultural and mining wastewater, grey-water waste as they impact upon people and the environment. Good sanitation includes appropriate health and hygiene education and behaviour, hand hygiene and acceptable, affordable and sustainable sanitation services"</i> .
Sanitation facility/ infrastructure	The structures and technology system(s) that create effective barriers between human excreta and human contact, from collection, transport, storage, treatment, reuse, to disposal.
Sanitation services	As per the 2016 National Sanitation Policy, it is <i>"the collection, removal, treatment and or disposal of human excreta, and domestic public institution wastewater, and the collection, treatment and/or disposal of municipal, agricultural, mining and industrial wastewater. This includes all the organisational arrangements necessary to ensure the provision of sanitation services including, amongst others, consideration of natural resources, social acceptance, appropriate health, hygiene and sanitation-related awareness and technologies, the measurement of the quantity and quality of discharges where appropriate, apply the polluter pays principle, the associated billing, collection of revenue and consumer care. Water services authorities have a right but not an obligation to accept industrial, agricultural and mining wastewater within their area of jurisdiction"</i> .
Sanitation services chain	The range of components in the service entailing containment, emptying, transport, treatment, end-use or disposal.
Service connection	A service connection is an entity to which the service is (or would be) delivered, and which receives one bill if the service is billed, <i>irrespective of the number of dwellings on the property</i> , alternatively known as a delivery point or access point. It is the responsibility of the owner of the property to ensure that each and all dwellings on that property have at least one connection/delivery point for potable water and one improved sanitation facility.
Sludge management	Sludge management entails the emptying, transport, treatment and disposal of wastewater, products of municipal wastewater treatment and effluent.
Solid waste management	Solid waste management is the approaches and processes employed to handle unrequired solid state matter (waste) to ensure a hygienic living environment.

Subsidised sanitation services	Sanitation services that are provided to those considered to be indigent, the cost of which (service) is covered by a grant or other funding instrument such as the local government equitable share (LGES) within the water services authority area.
Sustainable sanitation services	A sanitation service that meets the user and environmental requirements, at consistent levels without undue and extended interruption of access. It would typically encompass all the five aspects of sustainability, i.e. environmental integrity, social equity, economic efficiency; and appropriateness, underpinned by institutional support.
User participation	The highest possible meaningful and effective engagement, in appropriate and acceptable ways, of the end consumers of the service.
Wastewater	Any water whose pristine or potable quality has been altered by domestic, industrial or other use or process.
Water conservation	The minimisation of loss or waste of water, the care and protection of water resources and the efficient and effective use of water.
Water demand management (WDM)	The policies, strategies and practices by water institution or consumers that aim to influence the water requirement and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services and political acceptability.
Water services	Water service refers to what a user/consumer receives in terms of water quantity, quality, accessibility, reliability and appropriateness. The costs, or the affordability, of the supply should be considered as part of the service level, as it is a reflection of the financial (or management) costs to provide a certain service level. Water supply services and/or sanitation services, or any part thereof, in a reliable, affordable, effective, efficient, sustainable and equitable manner.
Water services authority	Any municipality that has the executive authority to provide water services within its area of jurisdiction in terms of the Municipal Structures Act 118 of 1998 (South Africa, 1998a) or the ministerial authorisations made in terms of this Act.
Water services provider	A water services provider is any person who has a contract with a water services authority or another water services provider to sell water to, and/or accept wastewater for the purposes of treatment from that authority or provider (bulk water services provider); and/or any person who has a contract with a water services authority to assume operational responsibility for providing water services to one or more consumers (end users) within a specific geographic area (retail water services provider); or a water services authority which provides either or both of the above services itself.

Principles

3. The principles underpinning the norms and standards

The norms and standards set out in this document are based on the National Water Act (previous and revised versions), the Water Services Act (no 108 of 1997), the 2016 National Sanitation Policy (DWS, 2016) and all the other legislation, including but not limited to the lessons that the sector has learned to date.

A water services authority shall, in the execution of its duties to provide water and sanitation services, be guided by the following underlying principles (see Annexure B for more detail):

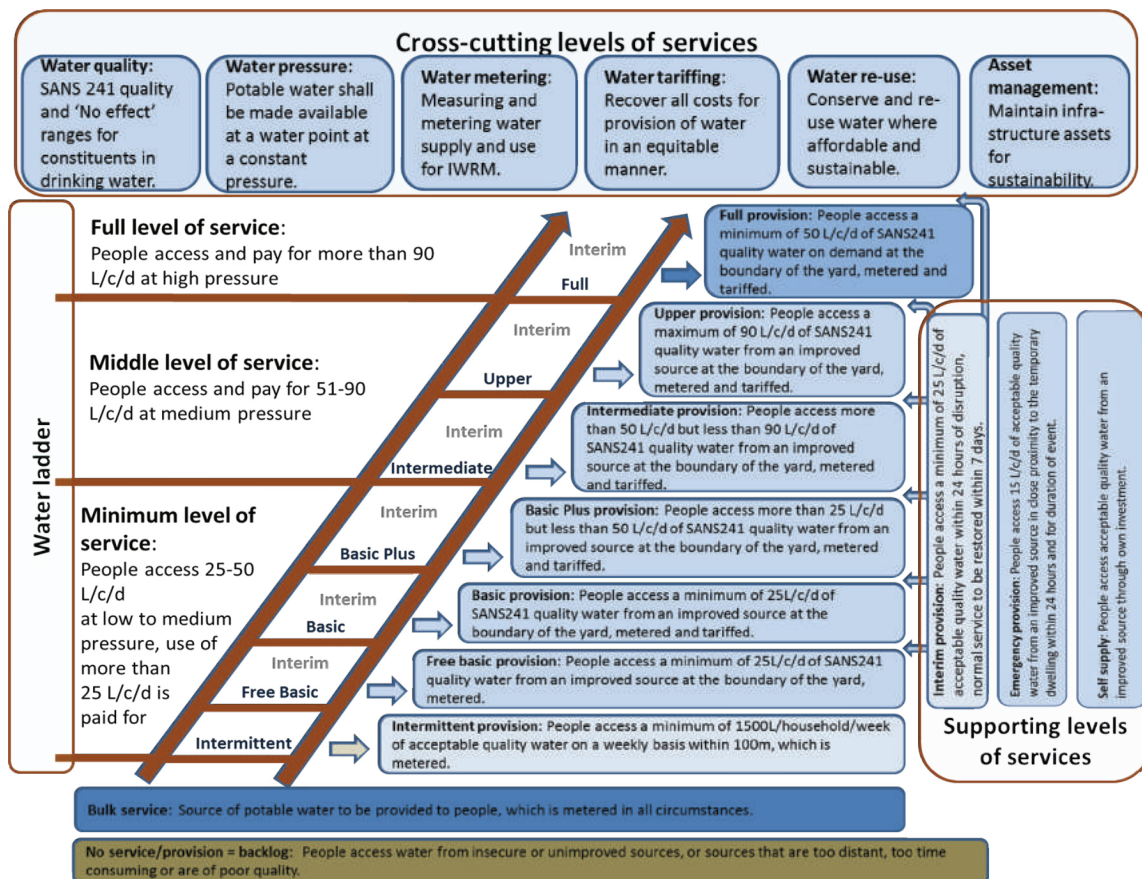
- 1) Equity to ensure access for all.
- 2) Acceptability, safety and hygiene.
- 3) Economy and affordability.
- 4) Effectiveness and efficiency.
- 5) Reliability.
- 6) Appropriateness, including in the choice of infrastructure/systems.
- 7) Protection and conservation of the environment.
- 8) Monitoring and regulation for effectiveness and appropriateness.

Thus, the goal of levels of services in the provision of water to consumers (households and public

“Wherever practical, water services and infrastructure must provide water for multiple use and accommodate mixed levels of service within communities, allowing consumers to elect a level of service which suits their needs, is affordable to them (within the prevailing subsidy framework), addresses inequalities, utilises appropriate and upgradable technologies, and is governed effectively and responsibly to ensure sustainability”.

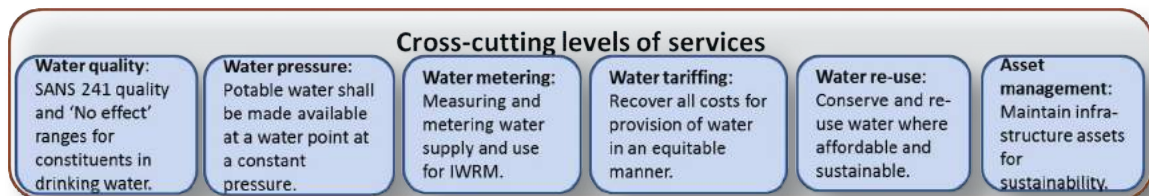
facilities) is based on mixed level of services and multiple use of water:

PART ONE



Norms and standards for Water Supply Services

Cross-cutting norms and standards for water supply



4. Cross-cutting norms and standards for water services

The requirements for water quality, water pressure, water metering and water tariffing pertain to all levels of service. The Minister responsible for water supply reserves the right to change and amend these norms and standards as necessary.

4.1 Water quality

It is essential that the water made available for different uses meets the quality standards relevant to that use, either human consumption, industrial purposes or for the maintenance of ecosystems. In making water available for human consumption, the SFWS uses the term "*potable water*". This quality standard is stipulated in the Water Services Act (Regulation relating to Compulsory National Standards, No. 5).

Goal: People have access to potable water that is fit for human use and comply with national water quality standards.

To this effect:

- 1) A water service authority (WSA) or provider (WSP), any municipality that has been assigned the executive authority to provide water services within its area of jurisdiction, shall comply with the Compulsory National Standards for the Quality of Potable Drinking Water (DWAf, 1996), SANS 241 and subsequent updated versions.
- 2) All water supplied to a household shall be tested by the water service authority/provider, with the frequency of testing depending on the size of the community. The SANS 241 drinking water specifications and the WRC Management Guidelines provide the relevant information regarding test requirements.
- 3) A WSA shall establish a suitable programme for sampling the quality of drinking water; specify the sampling points, frequency and which substances will be tested for in the water; compare the results with SANS 241 and if such results indicate that the water poses a health risk - inform the DWS, the Department of Health, and consumers immediately.
- 4) Consumers shall be educated about water quality and its importance for human health.

4.2 Pressure in a water reticulation system

The National Water Services Act (NWA, Regulation Relating to Compulsory National Standards, No. 15) states that "*every water reticulation system ... [should] operate below a maximum pressure of 900 kPa. Where water pressure in a water reticulation system could rise above 900 kPa ... the pressure at any domestic consumer connection [should be prevented] from rising above 900 kPa*".

Goal: People have access to potable water for human use at a constant pressure.

To this effect:

- 1) A water services authority/provider shall ensure that the maximum pressure 9 bar, (1 bar = 100 kPa) is adhered to.
- 2) Potable water shall be made available at a water point at a minimum of 10 litres per minute, regardless the level of service, in order to provide for access to the minimum quantity potable water of 25 L/c/d to consumers, or the 6 KL per month to a household.
- 3) The maximum pressure head during the reticulation (under static conditions) shall not exceed 90m (880 kPa), and the minimum pressure head during the design peak flow shall follow the table below [Note: Pressure in kPa = 9.81 × (Pressure Head in m)].

TYPES OF DEVELOPMENT	MINIMUM HEAD UNDER INSTANTANEOUS PEAK DEMAND (m)	MAXIMUM HEAD UNDER ZERO FLOW CONDITIONS (m)
Dwelling houses: house connections	24*	90
Dwelling houses: yard taps + yard tanks	10*	90

* Plus the height difference between the main and the highest ground level at any point on the erf not exceeding 50 m from the boundary adjacent to the main. A minimum head of 5 m for site-specific cases (e.g. developing on top of a hill) may be considered.

Figure 1: Residual water pressures(Source: CSIR, 2000).

- 4) All levels of services have a maximum *head* pressure of 900 kPa (or 90m), which is *consistent with the* requirement of the NWA. The minimum pressure under instantaneous peak demand is 240 kPa “full pressure” refers to the case “dwelling houses: house connections” in the table above, and “low pressure” refers to the case “dwelling houses: yard taps + yard tanks” in the table above.
- 5) The pressure at a demand point varies as demand varies. The typical water pressure head to a home in the water inlet shall be between 40-45 psi (290kPa), or 29m, not exceeding 60 psi (414kPa) or 41m. A pressure head below 24m can cause some common household applications not to function properly, and shall be avoided.

4.3 Water metering

The Regulations relating to Compulsory National Standards and Measures to Conserve Water (Government Notice R 22355 dated 08 June 2001), published in terms of the Water Services Act, stipulate that ‘water to any consumer must be measured by means of a water-volume measuring device, and that all water be supplied in terms of an agreement between the local authority and the consumer. Metering water districts within water distribution schemes is a requirement’.

Goal: All water use is measured and metered to enable Integrated Water Resource Management for ensuring sustainable and effective water use.

Thus:

- 1) All water use shall be measured and metered under all circumstances by way of a water measuring device. Water metering is interpreted as the measurement of information about water (typically water flow rate or pressure) in a pipe or conduit.
- 2) Water shall be viewed as an economic good as per the Integrated Water Resource Management (IWRM) principles, and all users shall be educated on the need for metering.

- 3) All water use shall be recorded through a water volume measuring device: free basic, pre-paid (tokens, smart meters etc.) and post-paid (tariffing, billing and cost recovery).
- 4) A water meter can be classified as follows:
 - Mechanical meter (the conventional type requiring a manual water reading);
 - Electronic monitor meter (electronically displays the water reading);
 - Automated meter reading (AMR) (*one-way* communication from the meter to report the water reading, usually wirelessly);
 - Smart meter (a *two-way* communication meter, communicating the water reading and receiving electronic communications, usually wirelessly, which gathers data for remote reporting. A smart meter, in increasing order of electronic sophistication, can be:
 - An automated meter management (AMM)
 - An interval metering with automated meter management (AMM-IM)
 - A prepayment meter (PPM)
 - An advanced metering infrastructure (AMI).
- 5) Even if water use is metered, the challenge of illegal connections remains. Users illegally install water connection points before the water metering point, thus enjoying free and uncontrolled water use. A water provider shall appoint dedicated staff to test the pipelines and identify/rectify all illegal connections.

4.4 Water tariffing

Tariffing is the financial component for recovering costs related to providing a service. The 1997 White Paper on Water Supply indicated that water must be “*valued as an economic resource, the costs incurred to make the resource available to users and the methods used to cover these costs*”. It is widely agreed that the setting of an appropriate price for a natural resource such as water can be an effective mechanism to achieve its effective and productive use. To avoid any conflict of interest, real or perceived, water use tariffs will be determined annually by the DWS in consultation with National Treasury (DWA, 2013a) and will be published in a separate guideline for water use tariffing.

Goal: All water use will be charged for to enable effective and productive water use.

- 1) The DWS prescribed norms and standards for water services tariffs in terms of Section 10 of the Water Services Act (1997), which were amended in 2016. These prescriptions shall be adhered to. The DWS reserves the right to, in future, review all tariffs along the water provisioning cycle and value chain, including water management charges, raw water tariffs, water board tariffs and the municipal tariffs for domestic, commercial and industrial users.
- 2) It is the responsibility of the WSAs to ensure that systems are in place for effective, efficient and timely collection of all revenue due.
- 3) Average tariff rates shall be determined for:
 - a. Survival – providing minimum access to water
 - b. Service – providing higher than minimum access to water
 - c. Sustainability – operation and maintenance
 - d. Developmental – new and expansion.
- 4) It is important to set a realistic tariff for levels of water services that will allow for full cost recovery.
- 5) Tariff policies shall be set by WSAs to cover the following:
 - a. Capital expenditure (creation of new works or capital redemption)
 - b. Operational costs (day to day running expenses)
 - c. Maintenance costs (planned, reactive and major maintenance activities)
 - d. Capital asset management expenditure (expansion, rehabilitation and replacement).
- 6) The WSAs shall provide the necessary support to ensure acceptance of the need to pay for services rendered. Consumers must be educated in:
 - a. Effective water use and conservation
 - b. Purpose of metering
 - c. Necessity of tariffing

- d. Tariffing and tariffing blocks
- 7) The costs associated with refining or establishing and aligning monitoring and evaluation efforts by the municipality shall be factored in. This also applies to the analysis and management of data.

4.5 Water re-use and recycling

Due to the looming water scarcity the country faces in the near future, the Minister of the DWS has highlighted the need for an 'integrated water approach,' that entails a sustainable and holistic value chain of water supply from source to tap and from tap back to source (DWS, 2014). In her budget vote for the DWS in May 2015 she said: *"The second pillar, 'Improving the Water Mix', involves the increased use of a variety of water sources in addition to our current reliance on surface water. These shall include groundwater, water harvesting, water-recycling and the re-use of treated acid mine water"* (<http://www.gov.za/speeches/address-minister-water-and-sanitation-ms-nomvula-mokonyane-occasion-budget-vote-201516-21>).

Goal: Water re-use and recycling will be investigated and advocated to ensure water conservation.

Thus:

- 1) The overall demand for fresh water shall be reduced through investigating and advocating water-wise landscaping, rainwater harvesting, and water-efficient appliances and fixtures, and implementing use patterns and manufacturing processes with lower water needs than conventional methods.
- 2) Greywater from baths, showers and hand basins can be successfully used for garden irrigation, flushing toilets or washing yards, cars, pavements and driveways. The Mvula Trust indicates that grey water can be re-used for activities such as gardening, agriculture, aquifer recharge, aquaculture, firefighting, flushing of toilets, industrial cooling, parks and golf course watering, formation of wetlands for wildlife habitats, recreational impoundments and essentially for several other non-potable requirements (<http://www.themvulatrust.org.za/2015/05/grey-water-re-use-is-here-to-stay/>), effectively relieving the pressure to produce potable water. Thus, these opportunities for use shall be investigated.
- 3) The NWRS2 (DWA, 2013b) has, as an annexure, a formal supporting strategy for water re-use called the 'National Strategy for Water Re-use'. This strategy shall be incorporated into the activities of the WSAs.
- 4) Productively re-using wastewater and greywater for irrigation shall be investigated as it can systematically prevent pollution via direct and incorrect disposal practices.
- 5) A level of caution shall be exercised with greywater re-use. Greywater composition depends on the water source, plumbing system, living habits, personal hygiene of the users, thus the physical, chemical and biological characteristics of greywater vary greatly among households and industries.
- 6) Greywater treatment can take many different forms with varying levels of complexity and treatment, and many economical and easy to install greywater systems are available on the market.
- 7) Greywater from kitchen sinks, dishwashers and washing machines can be introduced directly to a biologically active topsoil layer, where soil bacteria can quickly break down the solids, rendering the nutrients available to plants. This biological water purification is more effective than many engineered treatment, thus protecting the quality of groundwater and surface waters.
- 8) Greywater re-use is indirectly regulated by building, plumbing, and health codes written without consideration of greywater re-use.

- 9) In many cases the social acceptability of water re-use centre on religious and cultural values; affordability and financial benefits; difficulty; and ability to improve access to sufficient quality and quantity of water. This highlights the need for a participatory approach to the development of greywater re-use norms and standards, as well as technologies, so that the water needs and concerns of the consumers are addressed.
- 10) Increasing water re-use can assist in providing more resilience to managing the insecurity of water supply as a result of climate change. It now rests with the DWS and with water services providers to take water re-use into the future and to open up this avenue as a water source by amending their by-laws, creating the awareness and the demand for greywater re-use, and supporting those who want to implement greywater re-use and recycling.

4.6 Asset management

The Water Services Act (No. 108 of 1997) and the National Water Act (No. 36 of 1998) both contain extensive requirements for consultation by the services authorities and providers with users and stakeholders. These authorities are also responsible to the general public and to government to provide services in the most cost effective and sustainable manner possible. Thus, effective management of infrastructure is central to public sector institutions that seek to provide an acceptable standard of services to its customers and who want to support economic growth and development for a prosperous future. Infrastructure asset management (IAM) combines management, financial, engineering, economics and social practices and techniques within a coherent management framework, asset management plan and processes.

Goal: Water services shall implement effective asset management practices to ensure sustainable and reliable water services in the protection of public health and the environment.

To this effect:

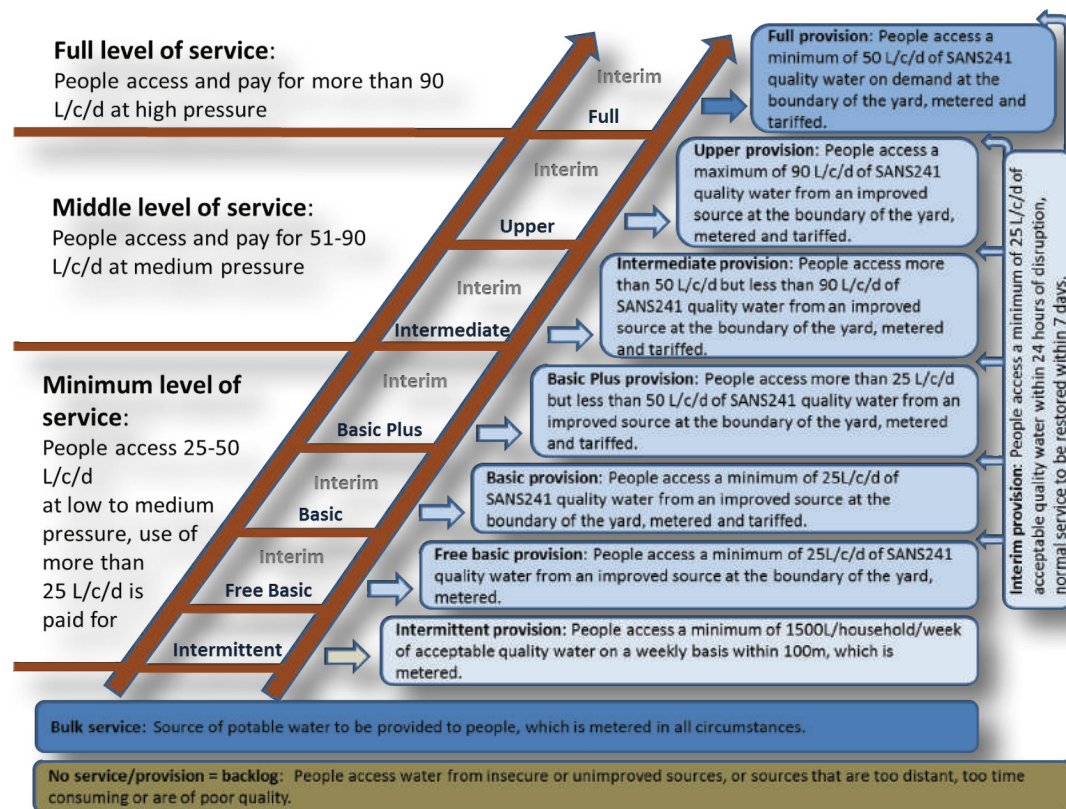
- 1) Water services authorities shall refer to the DWS's *Infrastructure Asset Management Strategy* (DWA, 2013c) and shall ensure that all water services and infrastructure are planned for their full life-cycle, and that all life-cycle elements and costs are considered.
- 2) Asset management shall be entrenched and on-going in the responsibilities of the services authority/provider.
- 3) Asset Management Plans and registers shall be compiled by services authorities/providers together with their water services development plans (WSDPs).
- 4) WSAs shall engage in dialogue with customers about the costs and risks associated with deteriorating assets to develop a more comprehensive needs assessment and enable analysis of different approaches to extend the life of infrastructure. This will assist services providers in explaining the value, benefits and costs of infrastructure repairs.
- 5) Water services authorities/providers shall:
 - (a) develop a Water Asset Management Plan in conjunction with their Water Services Development Plan;
 - (b) establish a water asset management team;
 - (c) establish levels of service and key performance indicators;
 - (d) create an inventory of water assets;
 - (e) design a risk assessment program, considering water assets to be managed and how they might fail;
 - (f) establish the remaining life of water assets;
 - (g) record all breaks and failures, including leaks;
 - (h) gauge current condition of water assets through condition assessments;
 - (i) plan renewal activities; and
 - (j) continuously improve water asset management activities.

Norms and standards for levels of water supply services

5. Norms and standards for levels of water supply services

The progressive realisation of universal access to safe water for all citizens in South Africa forms the cornerstone of the different levels of services and rungs of the water ladder within levels of services. Four levels of services for provision of water to people are available, each with a water ladder to progressively increase the level of water provision to people to facilitate improvement in quality of life and standard of living. These are the following:

- 1) Bulk level of service
- 2) Minimum level of service
- 3) Middle level of service
- 4) Full level of service.



People who do not have access to safe water from an improved source fall in the 'no service' category and constitute the water backlog. These people normally access unsafe and poor quality water from rivers, springs and/or small catchment dams/ponds, which are usually far from the dwelling, and do not use water treatment or purification methods to render the water safe for drinking. This section of the population must be the primary focus of service providers in the provision of a minimum level of service in order to comply with the SDGs, thus by 2030 all people in South Africa must have access to safe water from an improved source.

5.1 Bulk level of services

Provision of water includes both external and internal municipal services; i.e. meeting the water needs of households through the provision of appropriate bulk infrastructure in municipal services. In order to ensure that water services are efficiently delivered to consumers, bulk resources need to have adequate capacity and need to be managed properly. Levels of water services are redundant if the bulk supply is lacking or non-existent.

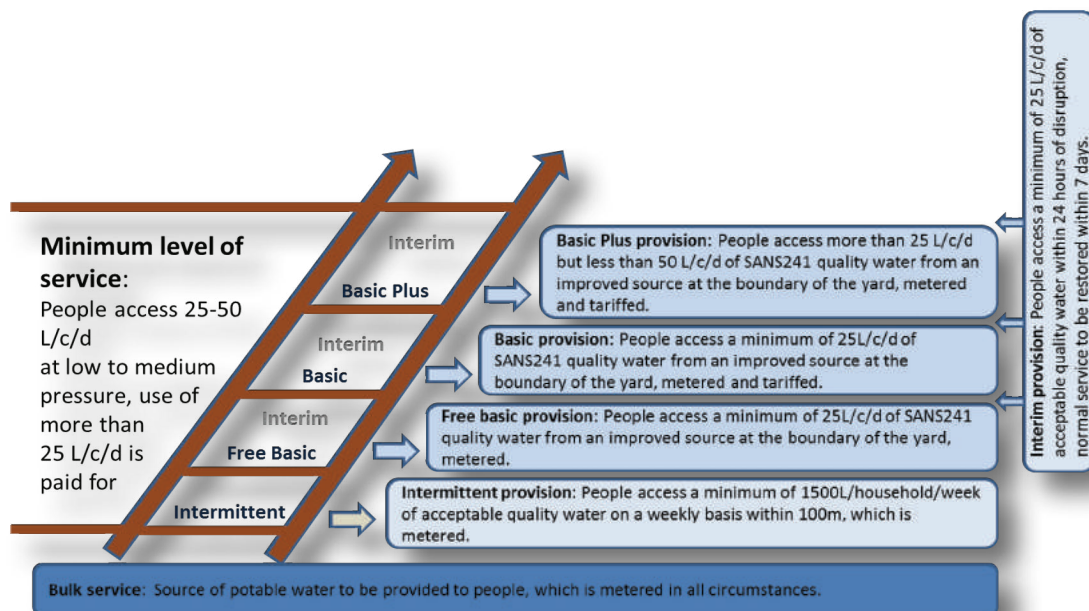
Goal: Bulk water services are sufficient and efficiently delivered to consumers to enable settlement and household level services.

To achieve this:

- 1) A water services authority shall ensure that adequate bulk water supply is available to enable water services.
- 2) A bulk water storage and distribution system shall be appropriate for the area in terms of cost, complexity and maintenance requirements in ensuring a continuous supply.
- 3) Some treatment of the raw water may be necessary to ensure that water is safe for human consumption.
- 4) Cognisance shall be taken of pressure requirements for annual average daily flow, peak flows, seasonal variations, and friction factors due to deterioration of pipes.
- 5) In order to prepare for different flows, all water use and/or supply shall be metered.
- 6) The supply of bulk water shall follow the Guidelines for the Design of Water Supply Systems and the relevant standards as set out by the SABS for pipes, valves and connections.

5.2 Minimum level of services

The minimum level of services is aimed at meeting people's survival and basic need for potable water, which is a human right, in an integrated manner where it is practical, affordable, financially viable and sustainable, while making the most efficient use of water resources.



Minimum level of service

The minimum level of services must meet this need though a water ladder at a minimum level. The rungs of the water ladder within the minimum level of service are:

- intermittent provision
- free basic provision
- basic provision
- basic plus provision.

5.2.1 Intermittent provision of water at a minimum level of water supply services

In line with the Strategic Framework for Water Services mandate of stepping up the water ladder when providing water supply, a WSA must in its planning, consider a minimum water supply that addresses at least current domestic requirements.

Goal: Meeting people's basic domestic need for potable water at a minimum level through providing water at regular intervals to ensure increased opportunities for improved health.

To this effect:

- 1) A minimum volume of 1 500 litres of potable water shall be made available to a household per week.
- 2) The water provided shall comply with the SANS 241 quality standards.
- 3) The access/delivery point shall be at a minimum a communal standpipe, or a storage facility in the yard (water container, yard tank, roof tank) of at least a volume of 1 500 litres.
- 4) In the case of a communal standpipe, it shall be within a reasonable walking distance of no more than 100m from the farthest household.
- 5) In the case of a storage facility in the yard (water container, yard tank, roof tank), it shall be refilled by a water tanker with potable water at least once a week.
- 6) The water shall be made available for 52 weeks per year.
- 7) All water use and/or supply shall be metered, but not tarified.
- 8) Maintenance of the infrastructure for this level of service is the responsibility of the WSA.
- 9) Point-of-use water treatment systems and methods shall be advocated.
- 10) Efforts shall be made to ensure user acceptance and understanding for this level of service.
- 11) Users shall be educated in effective water use and hygiene.
- 12) This level of service shall be phased out by 2030 to comply with the National Development Plan's requirement of providing a basic service of at least a yard connection for water.

5.2.2 Basic water supply services

A basic water supply services ensures the supply of potable water to a formal connection point at the boundary of a stand/yard, or of a public institution (school, clinic, hospital, etc). The lowest volume will be determined by the Minister responsible for water supply.

Goal: Meeting people's basic domestic need for potable water on a daily basis at a constant quantity, at the border of the yard and metered.

To this effect:

- 1) A minimum volume of 6 000 litres (or 25 litre per person per day) of potable water shall be made available to a household per month.
- 2) The water provided shall comply with the SANS 241 quality standards.
- 3) The access/delivery point shall be at least a yard connection.
- 4) The water shall be made available for at least 350 days per year, and not interrupted for longer than 48 consecutive hours.
- 5) All water use and/or supply shall be metered and tarified.
- 6) Water loss and leak detection shall be implemented to reduce water demand/use.

- 1) Maintenance of the infrastructure up to the boundary of the yard is the responsibility of the WSA, and the maintenance of the infrastructure within the boundary of the yard is the responsibility of the owner.
- 7) Greywater re-use and management shall be advocated.
- 8) Efforts shall be made to ensure user acceptance and understanding for this level of service.
- 9) Users shall be educated in effective water use and hygiene.

5.2.3 Free Basic water supply services to the indigent

The DWS requires that free basic water supply of a minimum of 25 litres per person per day be provided to only registered indigent households.

Goal: Meeting indigent people's basic domestic need for potable water on a daily basis at a constant quantity, at the border of the yard and metered.

To this effect:

- 1) A minimum volume of 6 000 litres of potable water shall be made available to a household per month.
- 2) The water provided shall comply with the SANS 241 quality standards.
- 3) The access/delivery point shall be at least a yard connection.
- 4) The water shall be made available for at least 350 days per year, and not interrupted for longer than 48 consecutive hours.
- 5) All water use and/or supply shall be metered.
- 6) Water loss and leak detection shall be implemented to reduce water demand.
- 7) Maintenance of the infrastructure for the service is the responsibility of the WSA.
- 8) Greywater re-use and management shall be advocated.
- 9) Efforts shall be made to ensure user acceptance and understanding for this level of service.
- 10) Users shall be educated in effective water use and hygiene.

5.2.4 Basic Plus water supply services

If a household is willing and able to pay for a higher level of service, a WSA, in its planning, need to make provision for a household to apply for a Basic Plus service.

Goal: Meeting people's need for potable water above basic level of service (but not full level of service), at the border of the yard, in an integrated manner where it is practical, affordable, financially viable and sustainable while making the most efficient use of water resources.

To this effect:

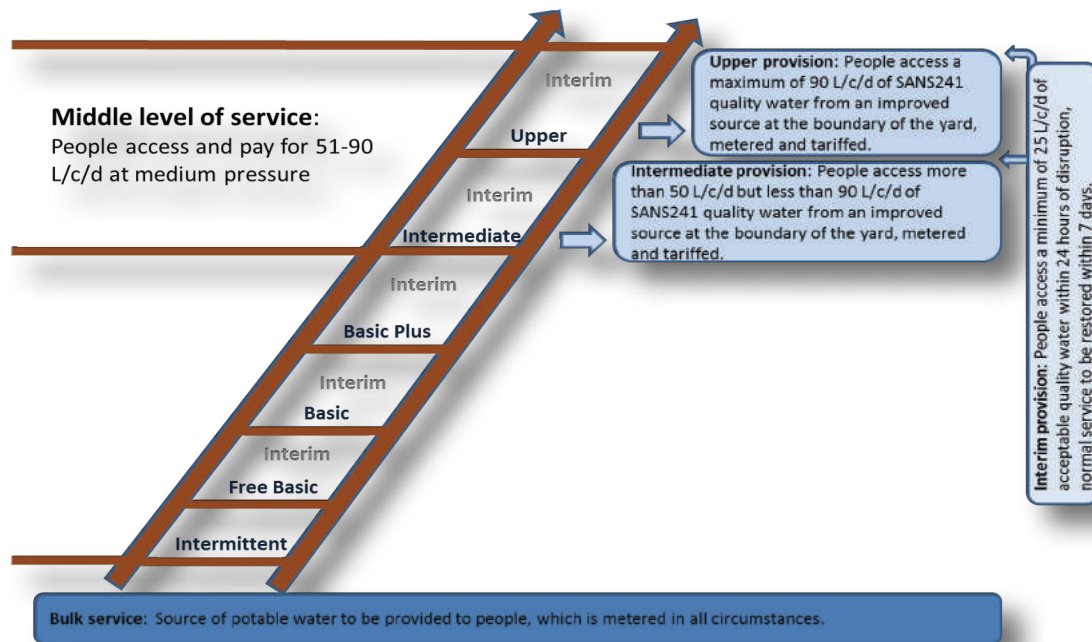
- 1) A volume of 25 litres up to 50 litres of potable water per person per day shall be made available to a household.
- 2) The Minister responsible for water supply reserves the right to impose water restrictions when necessary, but never less than 25 litres per person per day.
- 3) The water provided shall comply with the SANS 241 quality standards.
- 4) The access/delivery point shall be at least a yard connection.
- 5) The water shall be made available for 358 days per year, and not interrupted for longer than 48 consecutive hours.
- 6) All water use and/or supply shall be metered and tariffed.
- 7) Water loss and leak detection shall be implemented to reduce water demand and use.
- 8) Maintenance of the infrastructure within the boundary of the yard is the responsibility of the owner.
- 9) Greywater re-use and management shall be advocated.
- 10) Users shall be educated in effective water use and hygiene.

5.3 Middle level of water services

The middle level of service is aimed at meeting people's need for potable water, which is a human right, in an integrated manner where it is practical, affordable, financially viable and sustainable while making the most efficient use of water resources.

The middle level of service must meet this need through a water ladder at a middle level of service. The water ladder within the minimum level of service is:

- Intermediate provision of water
- Upper middle provision of water.



Middle level of service

5.3.1 Intermediate level of water supply services

If a household is willing and able to pay for a higher level of service, a WSA, in its planning, needs to make provision for a household to apply for a higher level of service than basic services.

Goal: Meeting people's need for potable water above basic level of service (but not full level of service) at the border of the yard in an integrated manner where it is practical, affordable, financially viable and sustainable while making the most efficient use of water resources.

To this effect:

- 2) A volume of 50 litres up to 90 litres of potable water per person per day shall be made available to a household.
- 3) The Minister responsible for water reserves the right to impose water restrictions when necessary, but never less than 25 litres per person per day.
- 4) The water provided shall comply with the SANS 241 quality standards.
- 5) The access/delivery point shall be at least a yard connection.
- 6) The water shall be made available for at least 358 days per year, and not interrupted for longer than 48 consecutive hours.
- 7) The water shall be made available at a minimum pressure of 10 litres per minute.

- 8) All water use and/or supply shall be metered and tariffed.
- 9) Water loss and leak detection shall be implemented to reduce water demand.
- 10) Maintenance of the infrastructure within the boundary of the yard is the responsibility of the owner.
- 11) Asset management shall be implemented by the WSA.
- 12) Greywater re-use and management shall be advocated.
- 13) Users shall be educated in effective water use and hygiene.

5.3.2 Upper middle level of water supply service

If a household is willing and able to pay for a higher level of service, a WSA, in its planning, needs to make provision for a household to apply for a higher level of service.

Goal: Meeting people's need for potable water for domestic and productive use (drinking, cooking, washing, sanitation, watering animals, growing food, and generating income) at the boundary of the yard where it is practical, affordable, financially viable and sustainable in an integrated manner while making the most efficient use of water resources.

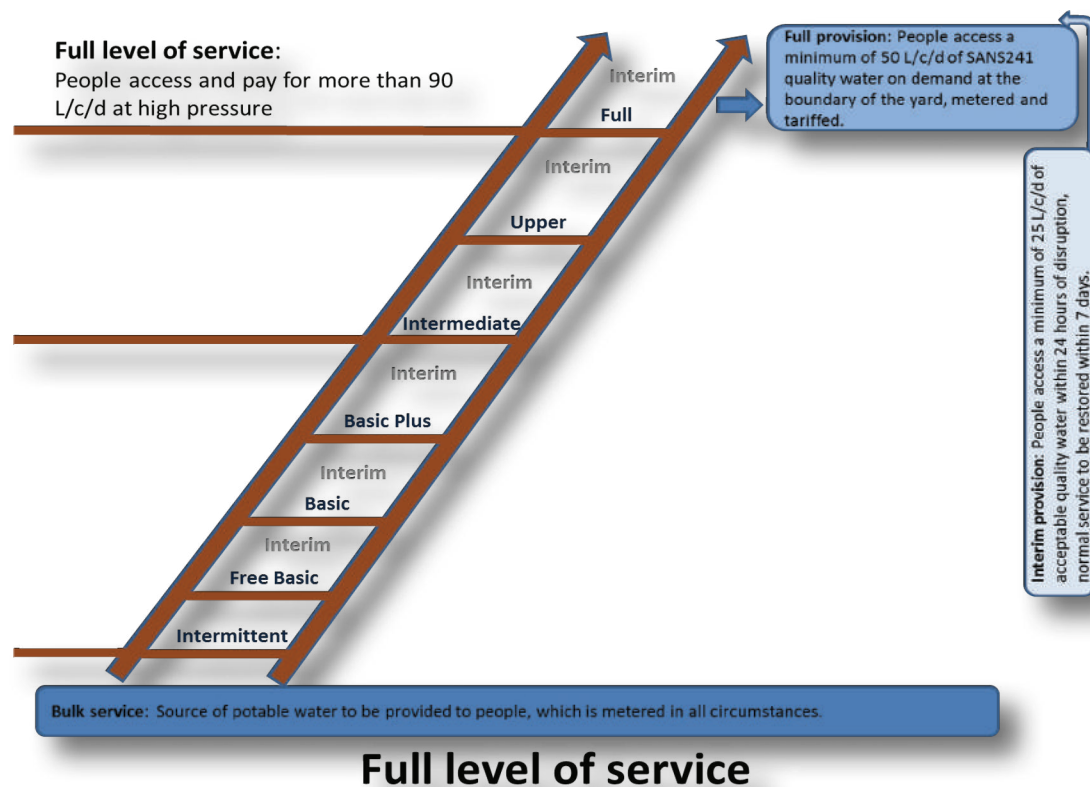
To this effect:

- 1) A volume of 90 litres of potable water per person per day shall be made available to a household.
- 2) The Minister responsible for water reserves the right to impose water restrictions when necessary, but never less than 25 litres per person per day.
- 3) The water provided shall comply with the SANS 241 quality standards.
- 4) The access/delivery point shall be at least a yard connection.
- 5) The water shall be made available for 365 days per year, and not interrupted for longer than 36 consecutive hours.
- 6) The water shall be made available at a minimum pressure of 10 litres per minute.
- 7) All water use and/or supply shall be metered and tariffed.
- 8) Water loss and leak detection shall be implemented to reduce water demand and use.
- 9) Maintenance of the infrastructure within the boundary of the yard is the responsibility of the owner.
- 10) Asset management shall be implemented.
- 11) Greywater re-use and management shall be actively advocated and shall become a daily practice. An advisory service to water re-use and recycling shall be made available.
- 12) Users shall be educated in effective water use and hygiene.

5.4 Full level of water services

A full service is the highest level of water supply service. The full level of service is aimed at meeting people's demand for water for all uses (domestic, business, agricultural, industrial, mining, etc.) in an integrated manner where it is practical, affordable, financially viable and sustainable while making the most efficient use of water resources.

Goal: Meeting people's need for potable water for domestic and productive use (drinking, cooking, washing, sanitation, watering animals, growing food, and generating income) on demand at the border of the yard where it is practical, affordable, financially viable and sustainable in an integrated manner while making the most efficient use of water resources.



To this effect:

- 1) An unlimited volume of potable water, no less than 90 litres per person per day, shall be made available to a household.
- 2) The Minister responsible for water reserves the right to impose water restrictions when necessary, but never less than 25 litres per person per day.
- 3) The water provided shall comply with the SANS 241 quality standards.
- 4) The access/delivery point shall be at least a yard connection.
- 5) The water shall be made available for 365 days per year, and not interrupted for longer than 24 consecutive hours.
- 6) The water shall be made available at a high pressure (not exceeding 9 bar/ 9kPa).
- 7) All water use and/or supply shall be metered and tarified.
- 8) Water loss and leak detection shall be implemented to reduce water demand and use.
- 9) Maintenance of the infrastructure within the boundary of the yard is the responsibility of the owner.
- 10) Asset management shall be implemented.
- 11) Greywater re-use and management shall be common practice.
- 12) Users shall be educated in effective water use and hygiene.

5.5 Interim level of water services

An interim level of water supply service is "a temporary water supply service [which] is an interim measure and should provide, within reasonable walking distance, water of an adequate quality from a health point of view", while repairs and/or reconstruction of a water services failure/interruption/breakdown are in effect.

Goal: Meeting people's need for potable water for domestic use (drinking, cooking, hygiene) within 24 hours of disruption of breakdown in existing services.

To this effect:

- 1) A minimum volume of 1 500 litres of potable water shall be made available to a household per week.
- 2) The water provided shall comply with the SANS 241 quality standards.
- 3) The access/delivery point shall be within a reasonable walking distance of no more than 100m from the farthest household.
- 4) In the case of a storage facility in the yard (water container, yard tank, roof tank), it shall be refilled by a water tanker with potable water at least once a week.
- 5) Potable water shall be made available per week until the disruption/breakdown has been rectified.
- 6) The WSA shall commit to rectifying the disruption/breakdown within 48 hours. Such a disruption/breakdown shall not last longer than 7 days.
- 7) All water use and/or supply shall be metered and tariffed.
- 8) Maintenance of the infrastructure outside the boundary of a yard is the responsibility of the WSA.
- 9) Unplanned interruptions/breakdowns to the services shall be prevented.
- 10) Communication to consumers of planned maintenance schedules is essential.
- 11) Point-of-use water treatment systems and methods shall be advocated.
- 12) Users shall be educated in effective water use and hygiene.

5.6 Emergency level of water services

An emergency level of water service is aimed at meeting displaced people's need for potable water for drinking and hygiene within 24 hours of the onset of a sudden or declared emergency or disaster situation and for as long as the situation persists. A slow on-set situation, such as a drought, is not regarded as an emergency, as the people were not displaced from their normal abodes. The Minister reserves the right to declare a slow on-set event as an emergency for which emergency water supply services should be provided.

Goal: Meeting people's need for potable water for domestic use (drinking, cooking, hygiene) within 24 hours of the onset of a sudden declared emergency or disaster situation and for as long as the situation persists.

Thus:

- 1) An emergency level of water service shall be provided within 24 hours of the onset of a sudden emergency situation or disaster where people has been displaced from their normal dwellings.
- 2) A minimum volume of 10 litres of potable water per person per day for drinking shall be made available to a temporary dwelling.
- 3) A minimum volume of 12 litres of potable water per person per day for personal hygiene shall be made available at a communal point within 50m of the temporary dwelling.
- 4) The water quality provided shall be acceptable and safe, with tolerable level of risk (focusing on counting E.coli only).
- 5) All water use and/or supply shall be metered.
- 6) Maintenance of the infrastructure is the responsibility of the WSA.
- 7) Point-of-use water treatment systems and methods shall be advocated.
- 8) Users shall be educated in effective water use and hygiene.

5.7 Water for fire fighting

Water for fighting fires is a community service provided by water service providers through their water network. The ability to fight the fire depends on access to sufficient water. Provision of network capacity to fight fires in the community is an important part of the water supply network intended to protect against loss of life and limit fire impact on the community.

Goal: Assisting in creating a fire-safe environment for the benefit of all people.

Thus:

- 1) The National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), Part W: *Fire safety – Fire threat to the community and environment*, SANS 10400-W:2011, Edition 3, shall be adhered to.
- 2) A WSA shall ensure that the required flow of water for fighting fires is available at all times in the water distribution network for extinguishing fires during an emergency.
- 3) Close liaison between the water department of the local authority and the fire service shall be maintained at all times, so that the water department can be of assistance in times of emergency – for example, isolating sections of the reticulation in order to increase the quantity of water available from the hydrants at the scene of the fire.
- 4) The provision of permanent equipment – like fire hydrants at business sites and institutional erven – should be considered and the type and location should be chosen to minimise vandalism or illegal use.
- 5) All fire installation pipework shall be constructed in accordance with the relevant requirements of SANS 2001-DP2 or SANS 2001-DP6 and shall have a pressure rating of not less than 1 200 kPa.
- 6) Water provision for firefighting from the potable WDS will be needed until alternatives for firefighting become more feasible in terms of cost.
- 7) The water use shall be metered for IWDM purposes. A water meter and any related valve(s) shall not significantly restrict the flow of water.
- 8) Users shall be educated in prevention of fires for effective water use.

5.8 Self-supply level of water services

“Self-supply” happens when people dig their own wells or construct water harvesting systems at household level or in small groups. These self-motivated efforts can make a large contribution to the availability of water for households and their neighbours. It brings the convenience of a household supply at low cost; and increases the likelihood of a sustainable service because self-supply means commitment, as well as investment.

However, planning and support from the water services provider of that jurisdiction are needed that will ensure households and others are supported in developing water supply at household level that is sustainable and of good quality.

A self-supply level of water services is aimed at supporting people who are meeting their own need for domestic water supply largely or wholly through own investment. These can be individual households, or small groups of households, or schools, or clinics. This is a growing trend across all classes of society in South Africa driven for instance by need, and in others by a desire, to live off the grid. It is therefore important for such to be regulated. The NDP (NPC, 2011: p 159) recommended that household grants should be made available for households utilising self-supply, especially outside formal settlement areas where serving scattered communities is challenging.

Goal: Supporting people who meet their own need for potable water for domestic and productive use (drinking, cooking, hygiene) wholly or partly through own efforts and investment.

To this effect:

- 1) The WSA shall advocate augmenting water use with alternative water sources, such as groundwater (springs, wells, boreholes), rainwater harvesting and stormwater harvesting.
- 2) The relevant regulations and protocols for groundwater and spring protection shall be applied.
- 3) Water use shall be metered or monitored for reporting and planning purposes
- 4) Guidelines shall be provided to self-supply households regarding treatment and purification of alternative water sources for domestic and personal use.
- 5) The WSA shall make available and advisory service to households wishing to self-supply.
- 6) The WSA shall assist with access to good quality products and services regarding self-supply.
- 7) The municipal by-laws shall be revised to allow for self-supply.
- 8) Maintenance of the infrastructure is the responsibility of the owner.
- 9) Point-of-use water treatment systems and methods shall be advocated.
- 10) Users shall be educated in effective water use and hygiene, with a focus on water quality requirements and water conservation.

5.9 Water services to public facilities

Water services to public facilities are aimed at meeting people's demand for potable water when not at home in an integrated manner where it is practical, affordable, financially viable and sustainable. Services provided must take into account service levels in the surrounding community. Furthermore, the norms and standards have been prescribed keeping in mind the core function of the public facilities.

All reasonable steps including metering, tariffing, consumer education, as well as appropriate design considerations shall be employed in line with the country's water conservation and demand management policies.

5.9.1 Water supply to educational facilities

No school, crèche, educational or correctional facility is allowed to function without potable water. The Department of Basic Education relies on the DWS's norms and standards for water provision to educational centres.

Goal: Meeting learners' and staff members' need for potable water (drinking and hygiene) at educational facilities where it is practical, affordable, financially viable and sustainable.

Thus:

- 1) A minimum volume of 15 to 20 litres of potable water per learner per day shall be made available to an educational centre.
- 2) A minimum volume of 90 to 140 litres of potable water per learner per day for boarding shall be made available to an educational centre and boarding facility.
- 3) The water provided shall comply with the SANS 241 quality standards.
- 4) The access/delivery point shall be one hygienic water terminal on the premises for every 130 learners and within 100m of the main building.
- 5) The water shall be made available for 350 days per year, and not interrupted for longer than 48 consecutive hours.
- 6) All water use and/or supply shall be metered and tariffed.
- 7) Water loss and leak detection shall be implemented to reduce water demand.
- 8) Refurbishment and maintenance of the infrastructure for the service is the responsibility of the Department of Basic and Higher Education.
- 9) Greywater re-use and management shall be advocated.
- 10) Efforts shall be made to ensure user acceptance and understanding for this level of service.
- 11) Learners, educators, and staff shall be educated in effective water use, water conservation and hygiene.

5.9.2 Water supply to child and health care facilities

No clinic or health centre is allowed to function without potable water. The National Core Standards for Health Establishments in South Africa (South Africa, 2011) do not explicitly make mention of norms and standards for water services, other than referring to a 'clean, safe and secure physical infrastructure' and 'a healthy and safe environment' as part of a patient's right. The Department of Health is thus directly dependent on the DWS's norms and standards for water provision to health care facilities.

Goal: Meeting children's, patients' and staff's demand for potable water at child care, clinics and health care centres where it is practical, affordable, financially viable and sustainable.

Thus:

- 1) A minimum volume of 15 to 20 litres of potable water per child/out-patient per day shall be made available to a care or health centre.
- 2) A minimum volume of 90 to 140 litres of potable water per in-patient per day shall be made available to a care or health centre.
- 3) A minimum volume of 15 to 20 litres of potable water per staff member per day shall be made available to a care or health centre.
- 4) The Minister responsible for water reserves the right to impose water restrictions when necessary, but never less than 25 litres per person per day.
- 5) The water provided shall comply with the SANS 241 quality standards.
- 6) Pathogenic contamination of drinking water shall be prevented at all costs.
- 7) A minimum volume of 300 litres of water of acceptable quality shall be made available to a care or health centre for laundry and general cleaning purposes.
- 8) The access/delivery point shall be one hygienic water terminal on the premises for every 130 patients and within 100m of the main building.
- 9) The water shall be made available for 365 days per year, and not interrupted for longer than 24 consecutive hours.
- 10) All water use and/or supply shall be metered and tariffed.
- 11) Water loss and leak detection shall be implemented to reduce water demand.
- 12) Refurbishment and maintenance of the infrastructure for the service is the responsibility of the Department of Health.
- 13) Greywater re-use and management shall be advocated.
- 14) Efforts shall be made to ensure user acceptance and understanding for this level of service.
- 15) Children, patients, and staff shall be educated in effective water use, water conservation and hygiene.

5.9.3 Water supply to other public facilities

Apart from educational and health care facilities, public facilities also include places where people gather and where a WSA/WSP is responsible for provision of water, such as cemeteries, funeral parlours and crematoria, local facilities (public amenities, community halls, taxi ranks, churches, police stations, etc), local sports facilities, and public places (parks, beaches and places of leisure).

No public facility is allowed to be used without access to potable water.

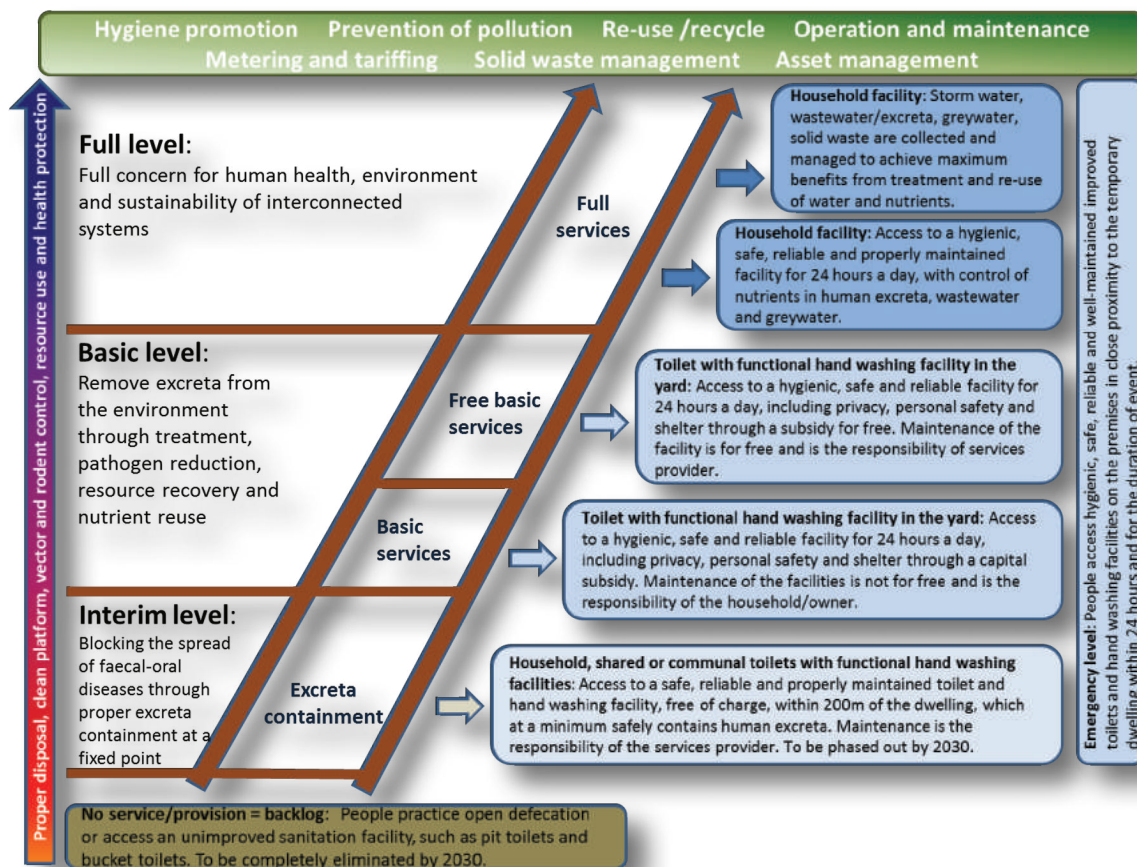
Goal: Meeting people's need for potable water for drinking and washing hands when they are in public spaces away from their home or work places.

Thus:

- 1) A minimum volume of 15 to 20 litres of potable water per person per day shall be made available to a public facility.
- 2) The Minister responsible for water reserves the right to impose water restrictions when necessary, but never less than 25 litres per person per day.

- 3) The water provided shall comply with the SANS 241 quality standards.
- 4) The access/delivery point shall be one hygienic water terminal on the premises for every 130 users and within 100m of the main building.
- 5) The water shall be made available for 350 days per year, and not interrupted for longer than 48 consecutive hours.
- 6) All water use and/or supply shall be metered and tariffed.
- 7) Water loss and leak detection shall be implemented to reduce water demand.
- 8) Refurbishment and maintenance of the infrastructure for the service is the responsibility of the WSA.
- 9) Greywater re-use and management shall be advocated.
- 10) Efforts shall be made to ensure user acceptance and understanding for this level of service.
- 11) Users - the public - shall be educated in effective water use, water conservation and hygiene through at least printed material at the facility.

PART TWO



Norms and standards for Sanitation Services

Core norms and standards for sanitation services

6. Core norms and standards for sanitation services



6.1 Hygiene education and promotion services

Healthy populations are essential for the advancement of human development, well-being and economic growth. The SDGs place a focus on the importance of hygiene – “by 2030, *achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations*” (<http://www.undp.org/content/undp/en/home/sdgooverview/post-2015-development-agenda.html>).

Goal: People have the knowledge and the means to protect themselves from disease and nuisance vectors that are likely to cause a significant risk to their health or well-being; and they can keep themselves and their environments clean.

To this effect:

- 1) A water services authority shall ensure that hygiene promotion is included as part of the sanitation service to ensure the blocking of faecal-oral and other related diseases.
- 2) A water services authority shall ensure that all women, men and children of appropriate ages are aware of key public health risks and are mobilised to adopt measures to ensure hygienic conditions prevail. In this regard:
 - a) In the short term, at least half of all women, men and children of appropriate ages, social and economic classes must be aware of key public health risks and are mobilised to adopt measures to preserve hygienic conditions and to effectively use and maintain the facilities provided. This should increase to 75% in the medium term and 100% in the long term.
 - b) In the short term, 75% of the population must have access to and be involved in identifying and promoting the use of hygiene items to ensure personal hygiene, health, dignity and well-being.
 - c) Hygiene promotion messages and activities must address key behaviours and misconceptions and be targeted at all relevant user groups.
- 3) Hygiene promotion shall form an integral part of the sanitation service, to be supported by and provides support to hardware components. In this regard:
 - (a) The design and implementation of the hygiene promotion component of the service shall be informed by at least one multi-disciplinary formative investigation or study;
 - (b) Hygiene promotion activities shall be well planned, executed, and monitored;
 - (c) Interventions must be applied throughout the service chain as necessary to preserve human health;
 - (d) Sufficient resources (time, personnel, materials, equipment) must be allocated; and
 - (e) In an emergency, at least one rapid assessment must be carried out to inform hygiene promotion activities.
- 4) A water service authority shall recognise participation, especially user involvement towards ownership and willingness to change as a key and central component of the programme; and in this regard:
 - (a) Programmes shall include an effective mechanism for representative and participatory input from all users, including the initial design of facilities.
 - (b) A water services authority shall, under the tenets of appropriateness, effectiveness, efficiency, participation, sustainability and unintended outcomes, make use of outcome measures in the monitoring and evaluation of hygiene components.

6.2. Pollution risk management

The risk of pollution of surface and groundwater resources from the existing and future sanitation systems should be prevented.

Principle 16 of the 1994 Sanitation White Paper states that economic incentives and penalties shall be used to prevent/reduce pollution of water resources and the environmental degradation due to pollution (DWAF, 1994). The person/legal entity who owns, controls, occupies or uses land is responsible for taking measures to prevent pollution of water resources and will be liable for all costs related to prevention of pollution or remedying the effects of pollution on the land in question.

Preventing pollution entails protection of groundwater, surface water and coastal waters; safe excreta disposal; greywater management; wastewater and sludge management; and effluent management.

6.2.1 Surface water, groundwater and coastal waters protection

It is imperative that toilets or drainage or spillage or discharge from sanitation systems does not contaminate surface water, groundwater sources and/or coastal waters.

The National Environmental Management Act (No 107 of 1998) (NEMA) requires the consideration of all relevant factors, including (amongst others) that pollution and degradation of the environment are

avoided, or, where they cannot be altogether avoided, are minimised and remedied; and environmental justice must be pursued (South Africa, 1998c).

Under the National Water Act (South Africa, 1998b), the status of groundwater was changed from private water to public water. The DWS policies and strategies for groundwater quality management in South Africa are focussed on “to manage groundwater quality in an integrated and sustainable manner within the context of the National Water Resource Strategy and thereby to provide an adequate level of protection to groundwater resources and secure the supply of water of acceptable quality.” (<http://www.dwa.gov.za/Documents/Other/Water%20Resources/NGSFeb07.pdf>).

In 2008, the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (ICM Act) was promulgated in order to improve the conservation and sustainable management of South Africa’s coastal environment. Under the ICM Act, anyone wishing to discharge effluent from a land-based source into coastal waters must apply to the Department of Environmental Affairs (DEA) for a coastal waters discharge permit. It is the intention of such permits to replace the requirements that exist under the Water Use Licenses (South Africa, 2008a).

Goal: Sanitation services shall not cause contamination of surface water, groundwater and/or coastal waters.

To this effect:

- 1) Household-level water treatment or other options shall be adopted in cases where groundwater pollution may not be an immediate concern and water is not to directly used for drinking.
- 2) Elevated toilets or septic tanks shall be built to contain excreta and prevent it contaminating the environment in flooded or high water table environments.
- 3) Where groundwater can be contaminated by a sanitation system, the risk shall be assessed or the groundwater periodically monitored, particularly where this water is intended for human consumption.
- 4) The guidelines made available in the publication *A protocol to manage the potential of groundwater contamination from on-site sanitation* by the Directorate of Geohydrology of the Department of Water Affairs & Forestry (DWA, 1997a), shall be observed.
- 5) The guidelines made available in the publication *South African Water Quality Guidelines for Coastal Marine Waters* by the Department of Environmental Affairs (DEA, 2012), shall be observed.

6.2.2 Safe excreta disposal

Safe disposal of human excreta is a major priority for the health of all beings.

Goal: The environment is free from human faeces.

To this effect:

- 1) A services authority shall ensure that, in the disposal of all excreta, the following are adhered to:
 - (a) Appropriate excreta containment measures shall be implemented at all times throughout the sanitation service chain;
 - (b) All excreta disposal and/or containment measures shall protect surface water, groundwater and groundwater sources from faecal contamination. Therefore:
 - i. All excreta containment measures, i.e. trench latrines, VIP toilets and soakaway pits, shall be at least 50 metres away from any groundwater source. This distance needs to be increased for fissured rocks and limestone, or decreased for fine soils.
 - ii. The bottom of any toilet or soak-away pit shall be at least 1.5 metres above the water table. Again, this distance needs to be increased for fissured rocks and limestone, or decreased for fine soils.
 - iii. Drainage or spillage from sanitation facilities shall not contaminate freshwater resources or create health risks for people or the environment.

- 2) In any event, a service authority shall ensure that open defecation does not compromise the excreta containment measures of a sanitation service. In this regard:
 - (a) The necessary by-laws and penalties shall be put in place and enforced at all times to reduce and ultimately prevent and end open defecation.
 - (b) The necessary measures and training shall be put in place and enforced to raise awareness and change practices to ensure that babies' and children's faeces shall be safely disposed of immediately and hygienically at all times.

6.2.3 Greywater management

Greywater from baths, showers and hand basins can be successfully used for garden irrigation, flushing toilets or washing yards, cars, pavements and driveways.

Goal: Sanitation services shall advocate and implement effective and sustainable greywater management practices to protect public health and prevent pollution of the environment.

To this effect:

- 1) The social acceptability of greywater re-use centre on religious and cultural values; affordability and financial benefits; difficulty; and ability to improve access to sufficient quality and quantity of water (Laban, 2010). This highlights the need for a participatory approach to the development of greywater re-use norms and standards, as well as technologies, so that the water needs and concerns of the consumers are addressed. Increasing greywater re-use can help provide more resilience to managing the insecurity of potable water supply as a result of climate change.
- 2) The safe disposal of greywater to prevent pollution shall occur through the most appropriate method in the context, and at least as follows (CSIR, 2000):
 - (a) *Casual tipping:* Casual tipping in the yard can be tolerated, provided the soil has good permeability and is not continually moist. Where casual tipping takes place under other conditions it may result in ponding and/or muddy conditions, with adverse health effects as mentioned above. Good soil drainage and a low population density can accommodate this practice.
 - (b) *Garden watering:* This practice can also be tolerated, provided plants and vegetables that are watered in this manner are not eaten raw, for disease transmission may occur.
 - (c) *Soakaways:* A soakaway is probably the safest and most convenient way of disposing of sullage, as long as soil conditions permit this. The design of the soakaway must adhere to the guidelines of SABS 0400. Designers should be aware that groundwater pollution is still a possibility, therefore the use of grease traps should be considered.
 - (d) *Piped systems:* The disposal of sullage in piped systems is hardly ever an economical solution, although it may be a viable option when dealing with communal washing points generating large amounts of sullage. Solids-free sewer systems are ideal for this purpose.
- 3) The 'polluter pays' principle shall apply and be enforced to prevent pollution of surface and groundwater resources and sources by greywater disposal.

6.2.4 Wastewater and sludge management

Wastewater is mostly generated as a by-product of the potable water service, and generates substantial external costs, if not properly managed.

Goal: Sanitation services shall implement effective and sustainable wastewater and sludge management practices to protect public health and prevent pollution of the environment.

To this effect:

- 1) Wastewater and sludge shall be managed by local authorities and service providers in an environmentally acceptable manner by adhering to the *Guidelines for the Utilisation and Disposal*

of *Wastewater Sludge Volumes 1 to 6* (Herselmann & Snyman, 2006). These guidelines replace all previous guidelines that are currently being implemented by the local authorities.

2) Emptying:

- (a) Sludge from all forms of on-site sanitation shall, at intervals, be removed from the pit or tank and conveyed to some treatment or disposal facility. If the pit or tank contains fresh sewage, the sludge shall be treated or disposed of in a way that will not be harmful to the environment or a threat to health.
- (b) If the waste matter has been allowed to decompose to the extent where there are no longer any pathogens present, such as in a VIP toilet, the sludge can be spread on the land as compost in a way that will not be harmful to the environment or a threat to health.
- (c) Sludge shall be disposed of only in accordance with the prescribed methods set out in the guidelines: *Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 5* (Herselmann & Snyman, 2006a).
- (d) It is possible to empty pits manually, using scoops and buckets, and to dig out the thicker sludge with spades, but this poses obvious health risks to the workers involved. In these cases workers shall be issued with protective gear, such as masks, gloves, rubber boots and overalls. The use of ventilated improved double-pit toilets can overcome this unpleasantness by allowing the excreta to decompose into a pathogen-free, humus-rich soil, after storage in the sealed pit for about two years.
- (e) The most suitable method of emptying a pit/septic tank mechanically involves the use of a vacuum tanker. The use of a vacuum is preferred to other pumping methods because the contents do not come into contact with the moving parts of the pump, where they can cause damage or blockages. Workers shall still be issued with protective gear, such as masks, gloves, rubber boots and overalls, to prevent contact with excreta and subsequent health problems.

3) Transport:

- (a) Construction of sewer systems shall adhere to municipal by-laws, the national building regulations and the relevant SABS standards.
- (b) The users of the sanitation sewer systems have a major impact on the effective functioning of the system. A Sewage Disposal Education Programme (SDEP) shall be put in place and implemented to curb high levels of sewage pollution and maintenance costs incurred through the abuse and misuse of sewer systems. Such a programme shall aim to establish a climate of civic responsibility by requesting communities and users to support their local government and businesses in the construction and development of healthy living environments (DMWS, 2010).

4) Treatment:

- (a) The nature of the sludge can vary widely and this shall be taken into account when designing the treatment works.
- (b) The technology or combination of technologies used at a treatment works shall depend on the quality of the effluent to be treated; the contributions of any unusual constituents (derived from light or heavy industrial effluents) to the domestic wastewater stream; the volume of effluent to be treated and its rate of increase in volume over time; the sensitivity of the receiving river system where the effluent is discharged; the financial resources available to the local authority responsible for operating the treatment works; and any specific conditions contained in the plant's wastewater discharge licence (Ashton, et.al., 2012).
- (c) Emptying facilities at treatment works shall consist of an apron onto which to discharge the contents of the vehicle and a wash-down facility.
- (d) Pond systems can be very effective in treating sludge from on-site sanitation systems. If the ponds treat only sludge from VIP toilets it may be necessary to add water to prevent the ponds from drying out before digestion has taken place.
- (e) Sludge from on-site sanitation systems can be treated by composting at a central treatment works, using forced aeration.

- (f) Although it is still necessary to treat sludge from on-site sanitation systems, the cost of treatment is lower than for fully waterborne sanitation. This is because partial treatment has already taken place on the site through the biological decomposition of the waste in the pit or tank. In addition, the treatment works do not have to be designed to handle the large quantities of water that must be added to the waste for the sole purpose of conveying solids along a network of sewer pipes to the treatment and disposal works.
- 5) Disposal:
- (a) Unless the sludge has been allowed to decompose until no more pathogens are present, it may pose a threat to the environment, particularly where the emptying of pits is practised on a large scale. The design of disposal facilities for the disposal of sludge shall be careful considered, as the area is subject to continuous wet conditions and heavy vehicle loads.
 - (b) The type of equipment employed in the disposal effort shall be known to the designer, as discharge speed and sludge volume need to be taken into account.
 - (c) Cognisance shall be taken of the immediate environment, as accidental discharge errors may cause serious pollution and health hazards.
 - (d) Pit-toilet sludge can be disposed of by burial in trenches of at least 0.8m to 0.9m wide, 6.0m long and 2.0m deep. These trenches shall only be allowed at appropriate and licensed disposal sites.
 - (e) Dehydrated faecal matter from urine-diversion toilets can be safely re-used as soil conditioner, or, alternatively, disposed of by burial or incineration.
 - (f) Dehydrated faecal matter may be co-composted with other organic waste.
 - (g) Sludge from septic tanks, aqua-privies, etc, shall be disposed of only in accordance with the prescribed methods in the *Guidelines for the Utilisation and Disposal of Wastewater Sludge Volume 3: Requirements for the on-site and off-site disposal of sludge* (Herselmann & Snyman, 2009).
- 6) Re-use:
- (a) The beneficial use of sludge shall be encouraged to ensure sustainable sludge management. However, not all the sludge produced in South Africa is of such quality that it can be used beneficially, which leaves disposal as the only feasible option.
 - (b) The “*Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 5*” (Snyman & Herselmann, 2006a, 2006b), which classify the sludge in terms of microbiological content, stability and organic and inorganic pollutants, shall be adhered to.
 - (c) Constructed wetlands are recognised as a reliable wastewater treatment technology option that represents a suitable low-cost solution for the treatment of many types of wastewater, including urban runoff, municipal, industrial, agricultural and acid mine drainage. In small rural settlements consisting of a few hundred people, where there is sufficient space for a constructed wetland, this may prove to be a viable option for sewage treatment (Ashton, et.al., 2012).

6.2.5 Effluent management

Regulations indicate that a sanitation services institution is only obliged to accept the quantity and quality of effluent or any other substance into a sewage system that the treatment plant linked to that system is capable of purifying or treating to ensure that any discharge to a water resource complies with any standard prescribed under the National Water Act (South Africa, 1998b) and the minimum requirements governing waste water disposal. The DEA has taken the view that the disposal of effluent into coastal waters can be considered a viable option provided that it is conducted in an environmentally sustainable manner and does not adversely affect other beneficial uses of the marine environment. The requirements of the coastal aquatic ecosystem, as well as the requirements of the beneficial uses of coastal water resource, will ultimately inform how a particular discharge is managed ([https:// www.environment.gov.za/mediarelease/effluentcoastalwaters](https://www.environment.gov.za/mediarelease/effluentcoastalwaters)).

Goal: Sanitation services shall implement effective and sustainable effluent management practices to protect public health and prevent contamination and pollution of the environment.

To this effect:

- 1) Water Services Providers shall be licensed in terms of the National Water Services Act (108 of 1997). Natural water sources can only handle a limited pollution load. Every institution that discharges effluent into a water body (river, stream, lake, and reservoir) shall have an authorisation to do so from the Department of Water and Sanitation. The authorisation specifies the types and maximum levels of contaminants that the effluent is allowed to contain.
- 2) Off-site wastewater treatment is considered a specialised subject and where the introduction of a treatment works is considered, specialist consultants shall be involved.
- 3) The 2016 National Sanitation Policy emphasises the 'polluter pays' principle, suggesting a levy/penalty for anyone discharging water containing pollutants.
- 4) If accepting that discharge pose a risk to the treatment process or lead to a breach of the permit/license, the water services institution shall only agree to accept the effluent once the harmful substances have been removed or reduced. Industries can comply by pre-treating their effluent such that it complies with the permit/license conditions; separating effluent discharges and treating the harmful component of the discharges separately; or collecting harmful streams that are then removed by appropriate waste disposal contractors.
- 5) The quality of effluent emanating from a wastewater treatment works is prescribed by legislation and shall meet licensing requirements.

Table 1: Standards for effluent discharge

Determinant	Unit	General Limit	Special Limit
Faecal Coliforms	No/100mℓ	1000	0
Chemical Oxygen Demand*	mg/ℓ	75	30
pH		5.5-9.5	5.5-7.5
Ammonia (as Nitrogen)	mg/ℓ	6	2
Nitrate/Nitrite as Nitrogen	mg/ℓ	15	1.5
Chlorine as Free Chlorine	mg/ℓ	0.25	0
Suspended Solids	mg/ℓ	25	10
Electrical Conductivity	mS/m	(70mS/m above intake) max 150mS/m	(50mS/m above intake) max 100mS/m
Ortho-Phosphate as phosphorous	mg/ℓ	10	1 (med.) 2.5 (max)
Soap, oil or grease	mg/ℓ	2.5	0

**after the removal of algae*

- 6) Before water services institution allows an industry or business to connect to its sewerage system, it shall consider the effect of that discharge on the quantity and especially the quality of the effluent ultimately discharged from the treatment works.
- 7) The quantity and the concentration of the effluent shall be considered together to get the total contaminant load. Industries shall not be allowed to dilute effluent in order to comply with set concentration limits. Water Services institutions shall monitor the effluent discharge by large industrial consumers on a regular basis in order to ensure compliance is maintained on an ongoing basis.
- 8) The eutrophication (nutrient enrichment) in aquatic systems where effluents are discharged shall be prevented. According to Ashton et.al. (2012), Frost and Sullivan indicate that three stages or processes are required to prevent eutrophication in South Africa:
 - Infrastructure investment to bring existing sub-standard wastewater treatment works up to normal (acceptable) operational standards;

- Introduction of a biological nutrient removal stage at the wastewater treatment works; and
- Proper operations of the biological nutrient removal system.

6.3. Wastewater, greywater and nutrient re-use

Adoption of wastewater and greywater re-use strategies reduces the pressure on the potable water resources and creates a balance between available resources and demands.

6.3.1 Wastewater re-use

Wastewater is mostly generated as a by-product of the potable water service, and generates substantial external costs, if not properly managed. The disposal of wastewater is subject to regulations and by-laws of relevant local councils, and the general and special standards reflected in *Regulation No 199 of May 1984: "Requirements for the Purification of Waste Water or Effluent"* (Government Gazette, 1984).

Goal: Sanitation services shall advocate and implement effective and sustainable wastewater re-use practices to protect public health and prevent pollution of the environment.

To this effect:

- 1) Control measures for wastewater re-use are set out in the WRC's *Wastewater Risk Abatement Plan: A W₂RAP Guideline*, which states that it is critical that the issues of reclaimed water quality and the corresponding exposure risks must be addressed if the safety of reuse practices is to be debated on a rational basis (Van der Merwe-Botha & Manus, 2011).
- 2) International water quality guidelines for wastewater re-use have been issued by the World Health Organization (WHO, 2006):
 - (a) Productively re-using wastewater and greywater for irrigation and systematically can prevent pollution via direct and incorrect disposal practices.
 - (b) A level of caution must be exercised with greywater re-use. Greywater composition depends on the water source, plumbing system, living habits, personal hygiene of the users, thus the physical, chemical and biological characteristics of greywater vary greatly among households and industries.
 - (c) Wastewater may contain pathogenic microorganisms (including bacteria, viruses and parasites) in concentrations high enough to cause health, indicating the importance and necessity of wastewater treatment prior to re-use.
 - (d) Indirect re-use of reclaimed wastewater may be applied in recharge basins for infiltration in aquifers to augment groundwater.
 - (e) Direct re-use of wastewater through water reclamation and re-use projects, especially replacement of Environmental Water Requirements (EWR) and indirect water re-use, must be pursued. The financial aspect of this approach is attractive as construction can be phased as demand grows, but the hurdle of public perception and acceptance will have to be crossed.
- 3) The economic feasibility of wastewater re-use must be ensured through a careful life cycle cost-benefit analysis that considers the context and a full appreciation of the true costs of drinking water supply provision. There are potentially large savings that may be realised in avoiding treating water to drinking standards for non-drinking uses.
- 4) Tariffs have been shown to significantly influence potential consumers' willingness to embrace wastewater re-use. Incentives to achieve wastewater tariffs lower than drinking water tariffs may include subsidies to consumers for wastewater reuse, utilisation of existing infrastructure (e.g. WWTWs), and/or the installation of a reuse system during the construction of new buildings.
- 5) To guarantee a high level of service for wastewater re-use, a program of regular control and monitoring of influent from various sources must be implemented by services providers. Wastewater re-use must not be implemented where the qualified institutional capacity is lacking.
- 6) Wastewater can be re-used in the following manners with certain provisos regarding the risks to humans and the environment:

- (a) In urban areas for flushing toilets
 - (b) Agricultural irrigation
 - (c) Environmental reuse – wetland restoration, stream augmentation, groundwater recharge
 - (d) Industrial use – cooling water
 - (e) Indirect potable use.
- 7) Public perceptions are strongly informed by the general awareness of the poor operation, maintenance and performance of municipal wastewater treatment plants at present. The performance of municipal wastewater and effluent treatment plants nationwide shall be improved to meet high standards, resulting in consistently good quality discharges to the environment.
- 8) An effective and sustained communication drive shall be implemented to raise awareness and increase users' knowledge about the benefits of wastewater re-use. This communication programme shall accommodate the users' socio-cultural traditions and beliefs; needs and expectations.

6.3.2 Greywater re-use

Greywater re-use is referenced in the National Water Act (NWA) under "*the use of water containing waste for irrigation purposes*", a "*controlled activity*" requiring a wastewater irrigator to obtain a licence. Greywater is also categorised as domestic wastewater under the general authorisation (GA) regulatory requirements of the DWS (Government Gazette, 2013).

Goal: Sanitation services shall advocate and implement effective and sustainable greywater re-use practices to protect public health and prevent pollution of the environment.

To this effect:

- 1) Greywater re-use shall not contravene the National Health Act (No 61 of 2003), or allow greywater to create a nuisance, which is defined as fly/mosquito breeding, objectionable odours, the surface ponding of water and/or the entry of polluted water onto a neighbouring property.
- 2) Greywater re-use shall be contained within the boundaries of the property/yard of the user.
- 3) Greywater may be used for small-scale irrigation under low pressure that does not exceed 6 meters head at the sprinkler to prevent atomising of contaminants. The use of phosphate free washing powders shall be advocated when greywater is used for irrigating gardens.
- 4) Successful implementation of greywater re-use requires that the concept and practices are accepted and supported by the general public. This acceptance becomes important especially related to water quality and costs. The public should be willing to encourage, support, and apply such projects even when reasonably extra costs are required. Therefore, an effective and sustained communication drive shall be implemented to raise awareness and increase users' knowledge about the benefits of greywater re-use. This communication programme shall accommodate the users' socio-cultural traditions and beliefs; needs and expectations.
- 5) Where greywater is re-used, users must receive technical training on how to use and maintain on-site greywater treatment systems.
- 6) Investment in further research and development regarding greywater re-use shall be made. For example, decentralised systems for wastewater reclamation are increasingly in use in collective buildings (hotels, hospitals, schools) or industrial facilities world-wide. In Japan, on-site individual buildings and block-wide wastewater recycling systems generated water for non-potable urban applications (toilet flushing in commercial buildings and apartment complexes) since 2003 (Funamizu & Onitsuka, 2008).

6.3.3 Nutrient management and re-use

Nutrient recovery and re-use has become increasingly prominent in light of resource scarcity, pollution and the push for a more circular economy. Recycling of nutrients between urban areas and farmland is a critical step towards an ecologically sustainable development. Human urine is the most nutrient-abundant part among the domestic waste components.

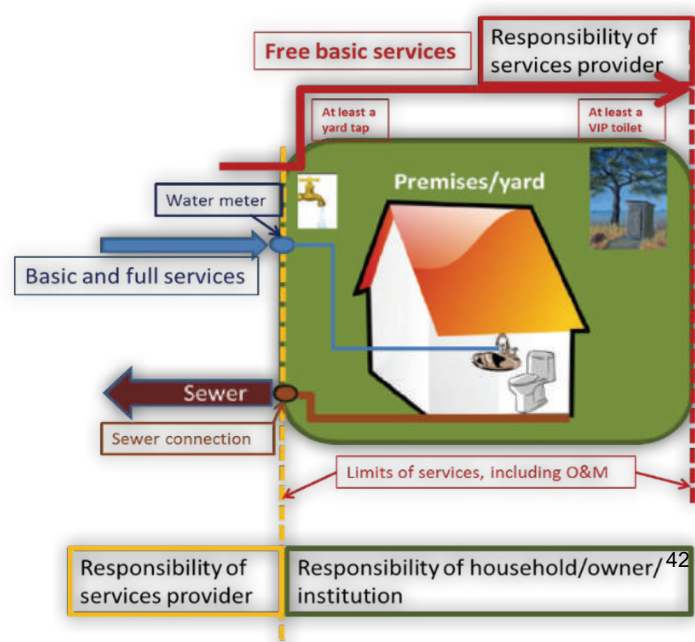
Goal: Sanitation services shall advocate and implement effective and sustainable nutrient re-use practices to protect public health and prevent pollution of the environment.

To this effect:

- 1) Currently no legislation exists in South Africa regarding nutrient re-use from human excreta. The World Health Organisation's guideline (WHO, 2006) on re-use of human excreta are built on the assessment and management of health risks associated with wastewater use through the application of various health protection measures during all steps of wastewater use and until it reaches the consumer and shall be adhered to.
- 2) Policy and legislation allowing for nutrient re-use are necessary pillars for the development of productive sanitation and sustainable agriculture on a larger scale and shall be developed post haste.
- 3) Agriculture can be a driver for sanitation as it can create demand for sanitation systems that simplify nutrient re-use, which in turn can lead to local business opportunities. Involvement of farmers is crucial to ensure the performance of the productive sanitation system, i.e. that nutrients actually are re-used in agriculture.
- 4) Local government shall play a key role as facilitator and regulator, finding ways to promote innovation while holding service providers accountable and achieving a degree of protection to public health and the environment. The reuse of nutrients can only become a mainstream practice through cooperation between different levels of stakeholders, and by understanding that a closed-loop approach offers advantages for all.
- 5) An effective and sustained communication drive must be implemented to raise awareness and increase users' knowledge about the benefits of nutrient re-use. This communication programme must accommodate the users' socio-cultural traditions and beliefs, needs and expectations. The "disgust factor" associated with nutrient re-use can be overcome by, for example, renaming the treated faeces and urine as "solid" and "liquid" fertiliser after treatment.
- 6) Local re-use practices shall be included in guidelines for hygienic risk reduction.
- 7) An appropriate combination of treatment options shall be selected by considering the specific contaminants that are of concern, the intended use of the reclaimed water, costs, and other factors such as energy use or waste disposal options.

6.4 Operation and maintenance responsibilities

Operation and maintenance (O&M) refers to all of the activities needed for the provision of sustainable sanitation services. It is important that the operating and maintenance requirements suit the capacity of the municipality responsible for the necessary work. If services are provided that are difficult to operate the ongoing viability of



the service will be at risk owing to down time, leaving people without a service or causing damage to the environment.

Goal: Sanitation services shall provide effective and efficient operation and maintenance of sanitation infrastructure to protect public health and prevent pollution of the environment.

To this effect:

- 1) A services authority may define specific on-site sanitation components of a basic sanitation facility that will remain the responsibility of the household, and the household remains responsible for paying for these components.
- 2) Operation and maintenance services are linked to the level of services selected to a settlement or part of a settlement. A number of guidelines is available from the DWS and the WRC on the operation and maintenance of the technical components of sanitation services. These guidelines shall be utilised.
- 3) Services providers and authorities shall have clear by-laws regarding the operation and maintenance of sanitation infrastructure and facilities within their jurisdictions.
- 4) Responsibilities shall be clearly defined and maintenance personnel shall have the tools and skills to do their job effectively in ensuring effective maintenance.
- 5) Households and members of the community shall be well-informed about the sanitation system that has been installed. End-users shall be properly trained to ensure that the systems are operated correctly.
- 6) In a district level, NGOs, Community-Based Organisations (CBOs) and community members, who may be responsible for O&M and/or management of local infrastructure, shall be trained on technical matters, accounting and simple financial management, basic contract procedures, and monitoring and reporting.
- 7) Local technicians and caretakers shall be trained for the proper operation of the infrastructure to ensure full understanding and the implications of the system. Private operators or local engineering companies, which will take care of the maintenance of the systems, shall be trained in the type of maintenance activities that have to be carried out periodically.
- 8) Community members and consumers/users shall make sure that facilities are maintained, are in good condition, and are being used appropriately.

6.5. Sanitation metering and tariffing

Section 10 of the Water Services Act (108 of 1997), which regulates metering and tariffing, will be replaced by Section 57(B) of National Water and Sanitation Act Amendment Bill of 2014 (South Africa, 2014). The water services author is responsible for metering and tariffing of wastewater.

Schedule 4 of the Section 10 regulations set out the method for determining and disclosing costs pertaining to metering and tariffing of wastewater from sanitation services. Schedule 7 of the Section 10 regulations set out a methodology for determining revenue requirements (DWS, 2015).

Goal: Sanitation services shall implement effective and efficient sanitation metering and tariffing to ensure sustainable and reliable sanitation services.

To this effect:

- 1) A services provider/authority must set its sanitation tariffs so that its revenue, inclusive of all account transfers and grants allocated to sanitation services, is sufficient to recover:

- (a) all reasonable costs directly and indirectly associated with the operation, maintenance, refurbishment and development of sanitation services, sanitation services customer care and all costs associated therewith;
 - (b) payments required to redeem its sanitation services related loans over a reasonable period;
 - (c) a net surplus of a minimum of 6% per annum.
- 2) A water services authority must structure tariffs for providing sanitation services to consumers for mainly household use in a way that takes into account:
- (a) the viability and sustainability of sanitation services;
 - (b) the affordability of basic sanitation to poor households; and
 - (c) incentives to reduce the wasteful or inefficient water use in conveying sewage.

6.6 Solid waste management

The National Environmental Management: Waste Act (No 59 of 2008) places the duty of care on any persons or institutions who may cause significant pollution or degradation of the environment, requiring them to institute measures to either prevent pollution from occurring, or to minimise and rectify the pollution or degradation where it cannot reasonably be avoided.

Goal: Sanitation services shall advocate and assist with effective and sustainable solid waste management practices to protect public health and prevent pollution of the environment.

To this effect:

- 1) All households shall have access to refuse containers or skips that are emptied at least twice a week and are no more than 100 metres from a communal refuse pit. All waste generated by populations living in settlements shall be removed from the immediate living environment on a daily basis, and from the settlement environment at least once a week.
- 2) Waste buried or incinerated on-site in either household or communal pits, shall be covered daily with a thin layer of earth to prevent it attracting and breeding vectors, such as flies and rodents. Where domestic refuse is not buried on site, at least one 100L refuse container should be available per 10 households.
- 3) Children's faeces/nappies shall be disposed of by directly covering them with earth. Disposal sites shall be fenced off to prevent accidents and access by children and animals. Care must be taken to prevent any leachate contaminating the groundwater.
- 4) A timely and controlled safe disposal of solid waste with a consequent minimum risk of solid waste pollution to the environment shall be put in place.
- 5) Recycling of solid waste within communities/settlements shall be encouraged, provided it presents no significant health risk.
- 6) An effective and sustained communication drive shall be implemented on a monthly basis to raise awareness and increase users' knowledge about the benefits of solid waste management. This communication programme shall accommodate the users' socio-cultural traditions and beliefs; needs and expectations.

6.7 Asset management

The Water Services Act (No. 108 of 1997) and the National Water Act (No. 36 of 1998) both contain extensive requirements for consultation by the services authorities and providers with users and stakeholders. These authorities are also responsible to the general public and to government to provide services in the most cost effective and sustainable manner possible.

Effective management of infrastructure is central to public sector institutions that seek to provide an acceptable standard of services to its customers and who want to support economic growth and development for a prosperous future. Infrastructure asset management (IAM) combines management,

financial, engineering, economics and social practices and techniques within a coherent management framework, asset management plan and processes.

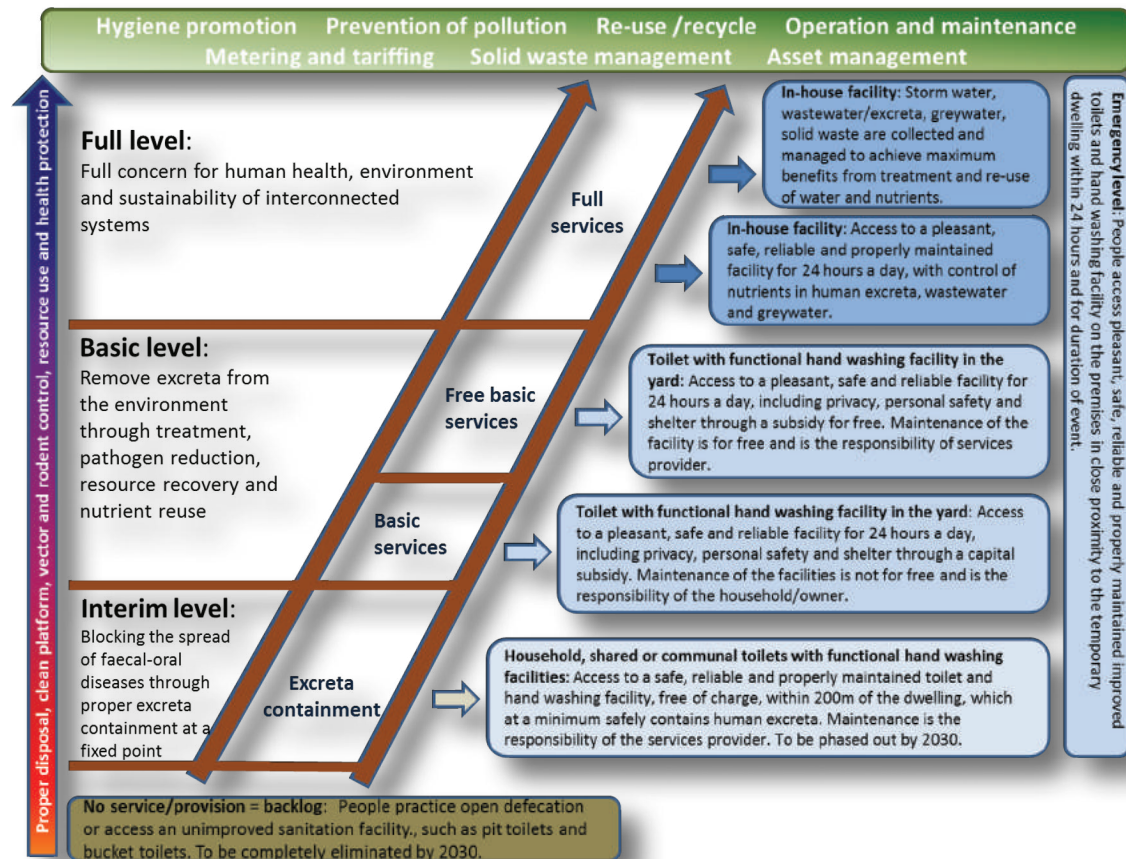
Goal: Sanitation services shall implement effective asset management practices to ensure sustainable and reliable sanitation services in the protection of public health and prevention of polluting the environment.

To this effect:

- 1) Services authorities shall ensure that all sanitation services and infrastructure are planned for the full life-cycle, and that all life-cycle elements and costs are considered and must refer to the DWS's *Infrastructure Asset Management Strategy* (DWA, 2013c).
- 2) Asset management shall be entrenched and on-going in the responsibilities of the services provider.
- 3) Asset management Plans and registers shall be compiled by services authorities/providers together with their WSDPs.
- 4) Engage in dialogue with customers about the costs and risks associated with deteriorating assets to develop a more comprehensive needs assessment and enable analysis of different approaches to extend the life of their infrastructure. This will assist services providers in explaining the value, benefits and costs of infrastructure repairs.
- 5) Sanitation services authorities/providers shall:
 - (a) develop a Sanitation Asset Management Plan in conjunction with their Water Services Development Plan;
 - (b) establish a sanitation asset management team;
 - (c) establish levels of service and key performance indicators;
 - (d) create an inventory of sanitation assets;
 - (e) design a risk assessment program, considering sanitation assets to be managed and how they might fail;
 - (f) establish the remaining life of sanitation assets;
 - (g) record all breaks and failures, including leaks;
 - (h) gauge current condition of sanitation assets through condition assessments;
 - (i) plan renewal activities; and
 - (j) continuously improve sanitation asset management activities.

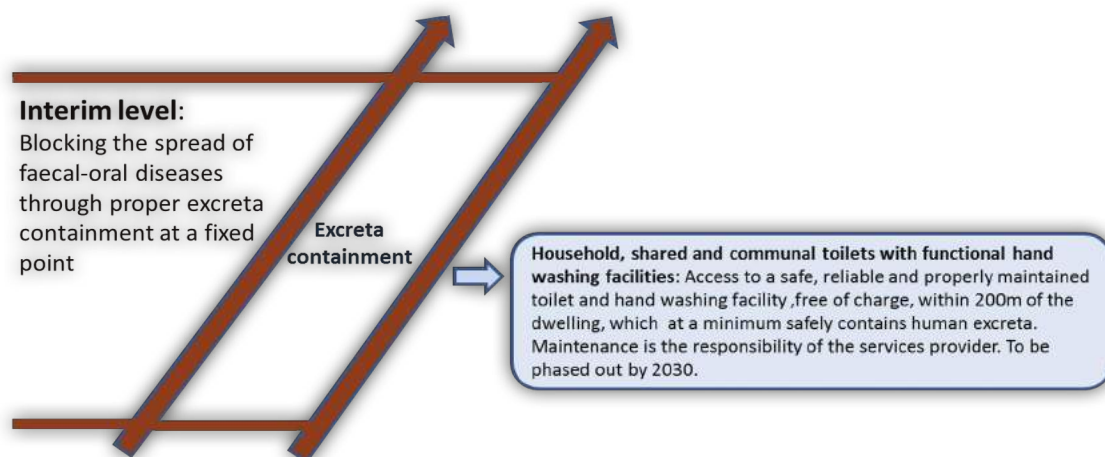
Norms and standards for levels of sanitation services

7. Norms and standards for levels of sanitation services



7.1 Interim sanitation services

The 2016 National Sanitation Policy defines interim sanitation as: “an interim measure to provide privacy to the user, be readily accessible and in close walking distance, and provide for the safe disposal of human waste, including hygiene and end-user education”.



Interim level of service

Goal: People access a pleasant, safe, reliable and well-maintained improved toilet and hand washing facility in close proximity for a period of time until a basic level of sanitation service can be established.

- (1) As with open defecation (OD), interim sanitation services shall be phased out by 2030 to comply with the aim of the National Development Plan (NPC, 2011) to provide universal access to sanitation services on a basic and higher than basic level to all citizens of South Africa, meaning each household will have at least one basic toilet and hand washing facility in/at their dwelling.
- (2) Interim services aim at providing access to a safe, reliable fixed point sanitation facility that properly and safely contains human excreta and provides a facility for hand hygiene in order to eradicate open defecation.
- (3) Interim sanitation services must provide at least the following:
 - (a) *Communal and shared facilities:*
 - i. Users shall be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Clean toilets are more likely to be frequently used.
 - ii. Plumbing in and for communal and shared facilities needs to be more robust than that installed on private premises, and shall comply with the general principles of the National Building Regulations. Precautions need to be taken in the design against vandalism, theft and misuse.
 - iii. Efforts shall be made to provide people living with chronic illnesses, such as HIV and AIDS, with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility.
 - iv. Where possible, communal and shared toilets must be provided with lighting, or users provided with torches. The input of the users must be sought with regard to ways of enhancing the safety of users.
 - v. Efforts to build a sense of communal ownership and pride of possession shall be made so that cooperation is voluntarily given or assured by peer pressure.

vi. Sufficient sanitation facilities shall be provided for the number of users:

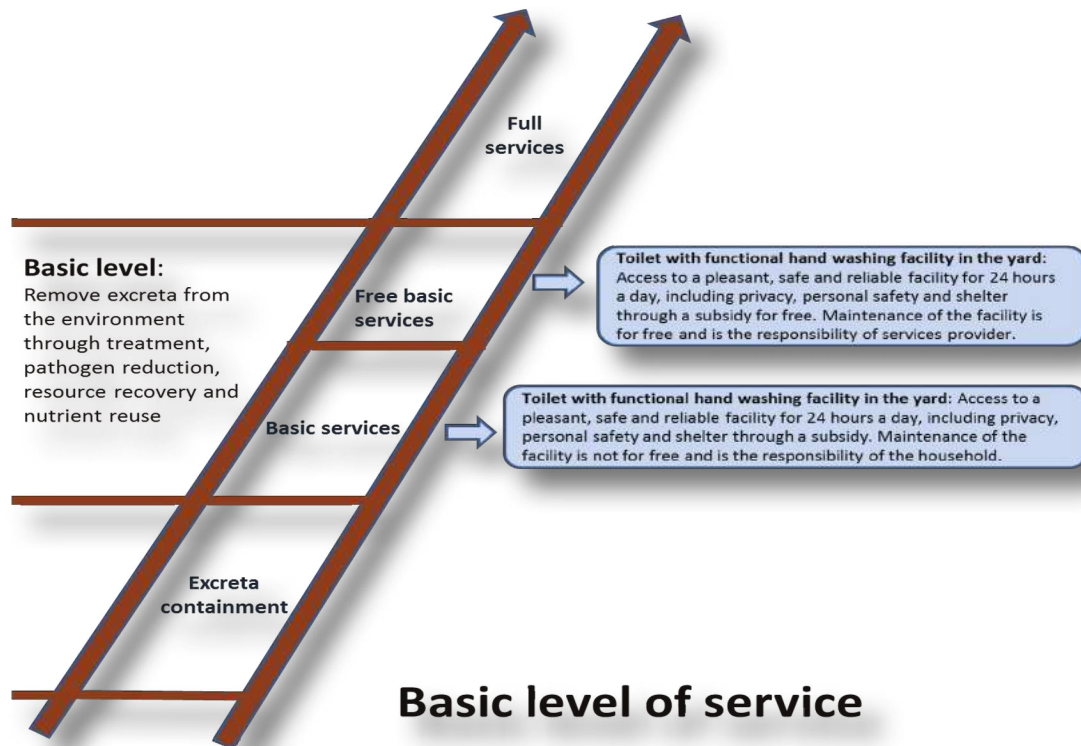
Type	Toilet seats	Urinal units	Hand washing
Communal toilet	1 seat per 50 users	1 unit per 100 users	1 basin per 10 toilet seats
Shared toilet mostly used all the time	1 seat per 20 users	1 unit per 50 users	1 basin per 4 toilet seats

vii. Shared and communal facilities shall have:

- separate toilet blocks for men and women with separate entries;
 - waste bins with lids in toilet block for women – emptied once a week and disposed of appropriately;
 - urinal facilities for men;
 - seats for children in the section for women;
 - waiting / circulating area;
 - separate washing cubicles for men and women;
 - facility to store large volumes of water (water-borne sanitation);
 - appropriate wastewater disposal system; and
 - store room for keeping the cleaning material / equipment.
- (b) *Water and anal cleansing material:* Water must be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or water for anal cleansing. Users must be consulted on the most culturally appropriate cleansing methods and materials, and the safe disposal thereof.
- (c) *Menstruation consideration:* Women and girls of menstruating age must have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls must be consulted on what is culturally appropriate. Toilets must include provision for appropriate disposal of menstrual material (waste bins with lids that are emptied regularly) or private washing facilities.
- (d) *Containment of children's faeces:* Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections). Parents and caregivers must be provided with information about safe disposal of infants' faeces, laundering practices and the use of nappies (diapers), potties or scoops for effectively managing safe disposal.
- (e) *Accessibility for all:* It may not be possible to make all toilets acceptable to all groups, but special toilets need to be constructed for children, older people and persons with disabilities, e.g. toilets with kiddie seats, or hand rails, or provision of potties or commodes.
- (f) *Operation and maintenance:* The services provider is fully responsible for the capital, operation, maintenance and refurbishment actions and costs pertaining to interim sanitation services. Blockages and health risks must be addressed and rectified within 24 hours.
- (g) *Hygiene promotion:* A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- (h) *Asset management:* The services provider shall account for all sanitation services assets in a way that ensures financial sustainability in an asset management plan as part of their WSDPs. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- (4) *Types of sanitation infrastructure/facilities:* The type of sanitation infrastructure or facility adopted and installed shall be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for

groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

7.2 Basic sanitation services



Goal: People access at least a pleasant, safe, reliable and well-maintained improved toilet and hand washing facility in within their yard.

- 1) A water services authority must ensure that human excreta is safely contained at all times, throughout the service chain:
 - (a) Each household must have uninterrupted access to an adequate, appropriate, sanitation facility; and
 - (b) Households should be supported with knowledge and any other relevant resources to take responsibility for the correct and consistent use of the sanitation service, including but not limited to the toilet facility.
- 2) A water services authority shall ensure that the economic value of the service is recognised:
 - (a) Sanitation services must be appropriately metered and tariffed;
 - (b) Each household pays for the service provided; on time, with reasonable debtors control steps to ensure sustainability of the service; and
 - (c) All users benefit from hygiene promotion to enable them to realise the greatest possible health and well-being benefits from the sanitation service.
- 3) A water service authority must wherever possible, ensure pathogen reduction, nutrient and resource re-use beyond containment. This also applies to the installation and maintenance of any associated infrastructure.
- 4) Solid waste and sludge management shall be an integral part of the sanitation service. The infrastructure, and its maintenance as well as disposal of any waste must be carried out on a regular basis, as frequent as necessary to maintain hygiene, by the water service authority.

- 5) In the case of **free basic services**, all the provisions of the *Free Basic Water Guidelines and Regulations* (DWAf, 2002), sections 18(1), 18(2), 18(3) and 18(4) shall apply. In addition;
- (a) As the household shall be indigent, the service will be provided at no cost to the user.
 (b) However, the cost of the service shall be covered through a subsidy or grant.

- 6) Basic and free sanitation services must provide at least the following:

(a) *In the case of free basic services to the indigent - shared facilities:*

- i. Users shall be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Clean toilets are more likely to be frequently used.
- ii. Plumbing in and for shared facilities needs to be more robust and shall comply with the general principles of the National Building Regulations. Precautions need to be taken in the design against vandalism, theft and misuse.
- iii. Efforts shall be made to provide people living with chronic illnesses, such as HIV and AIDS, with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility.
- iv. Where possible, shared toilets must be provided with lighting, or users provided with torches. The input of the users must be sought with regard to ways of enhancing the safety of users.
- v. Efforts to build a sense of shared ownership and pride of possession shall be made so that cooperation is voluntarily given or assured by peer pressure.
- vi. Sufficient sanitation facilities shall be provided for the number of users:

Type	Toilet seats	Urinal units	Hand washing
Shared toilet mostly used all the time	1 seat per 20 users	1 unit per 50 users	1 basin per 4 toilet seats

- vii. Shared facilities shall have:

- waste bins with lids in toilet block for women – emptied once a week and disposed of appropriately;
- urinal facilities for men;
- seats for children in the section for women;
- waiting / circulating area;
- separate washing cubicles for men and women;
- facility to store large volumes of water (water-borne sanitation);
- appropriate wastewater disposal system; and
- store room for keeping the cleaning material / equipment.

(b) *In the case of basic services - household facility:*

- i. Users shall be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Clean toilets are more likely to be frequently used.
- ii. Plumbing in and for the facilities needs to be more robust and shall comply with the general principles of the National Building Regulations. Precautions need to be taken in the design against vandalism, theft and misuse.
- iii. Efforts shall be made to provide people living with chronic illnesses, such as HIV and AIDS, with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility.
- iv. Where possible, household toilets must be provided with lighting. The input of the users must be sought with regard to ways of enhancing the safety of users.

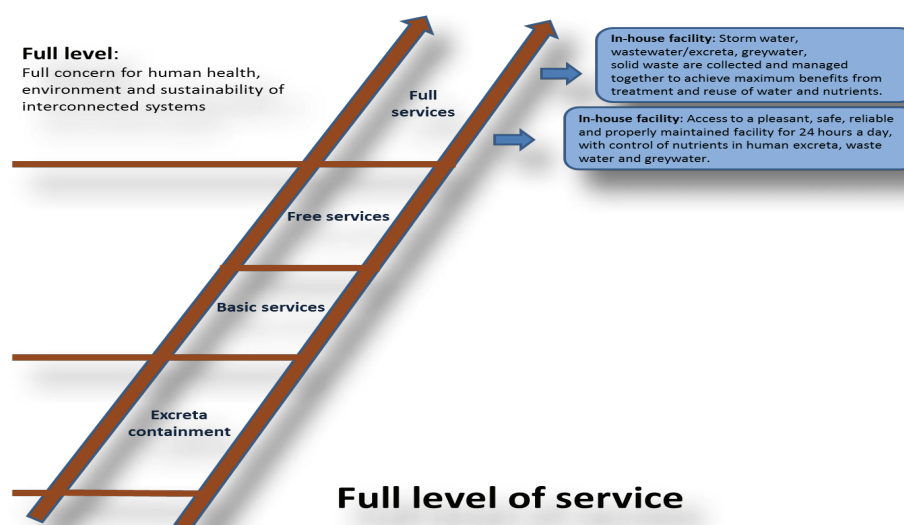
- (c) *Water and anal cleansing material:* Water must be provided for toilets with water flush and/or hygienic seal mechanisms.

- (d) *Menstruation consideration:* Women and girls of menstruating age must have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls must be consulted on what is culturally appropriate. Toilets must include provision for appropriate

disposal of menstrual material (waste bins with lids that are emptied regularly) or private washing facilities.

- (e) *Containment of children's faeces*: Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections). Parents and caregivers must be provided with information about safe disposal of infants' faeces, laundering practices and the use of nappies (diapers), potties or scoops for effectively managing safe disposal.
- (f) *Accessibility for all*: If a household care for one or more persons living with disabilities, a special toilet needs to be constructed for these persons with disabilities according to the building regulations and SANS 10400-S.
- (g) *Operation and maintenance*: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The household or owner must adhere to the relevant by-laws of their local municipality regarding on-site sanitation. The household or owner of the sanitation facility is fully responsible for all operation, maintenance and refurbishment actions and costs pertaining to on-site sanitation, unless it is provided as a free basic sanitation service in which case the local authority is responsible for these actions and costs.
- (h) *Hygiene promotion*: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- (i) *Asset management*: The services provider shall account for all sanitation services assets in a way that ensures financial sustainability in an asset management plan as part of their WSDPs. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- 7) *Types of sanitation infrastructure/facilities*: The type of sanitation infrastructure or facility adopted and installed shall be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

7.3 Full sanitation services



7.3.1 On-site sanitation services

On-site sanitation refers to the treatment and disposal of human waste on the property that it was generated and through a process that is not connected to a reticulated system. The treatment of wastewater occurs at a localised treatment facility close to the source of waste generation and may include septic tanks, packaged treatment plants, VIP toilets and urine diversion (UD) toilets.

Goal: People have rapid, safe and secure access at all times to adequate, appropriate and acceptable toilet facilities, in or sufficiently close to their dwellings.

- (1) On-site sanitation services are contained within the plot/stand, which may have one, or a number of dwellings. Human excreta and waste may be disposed of on site or removed manually for safe disposal elsewhere (WHO, 2006). Depending on the plot size, the treatment technology will be appropriate for one house, one compound or a small cluster of homes.
- (2) *Household facility:* Households should be consulted on the siting and design, and the responsible cleaning and maintenance of the toilet. Generally, clean toilets are more likely to be frequently used. Efforts should be made to provide people living with chronic illnesses such as HIV and AIDS with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility. Toilets must have lighting. The household is responsible for enhancing the safety of users.
- (3) On-site sanitation services must include the following:
 - (a) *Water and anal cleansing material:* Water must be available for toilets with water flush and/or hygienic seal mechanisms. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
 - (b) *Menstruation consideration:* Women and girls of menstruating age must have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls must be consulted on what is culturally appropriate. Toilets must include provision for appropriate disposal of menstrual material or private washing facilities.
 - (c) *Containment of children's faeces:* Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections). Parents and caregivers must be provided with information about safe disposal of infants' faeces, laundering practices and the use of nappies (diapers), potties or scoops for effectively managing safe disposal.
 - (d) *Accessibility for all:* It may not be possible to make all toilets acceptable to all groups, but special toilets need to be constructed for children, older people and persons with disabilities, e.g. toilets with seats or hand rails or provision of bed pans, potties or commodes.
 - (e) *Operation and maintenance:* Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The household or owner must adhere to the relevant by-laws of their local municipality regarding on-site sanitation. The household or owner of the sanitation facility is fully responsible for all capital, operation, maintenance and refurbishment actions and costs pertaining to on-site sanitation, unless it is provided as a free basic sanitation service in which case the local authority is responsible for these actions and costs.
 - (f) *Wastewater management and effluent disposal:* Sewage, sewage effluent and wastewater must be disposed of without causing a public health nuisance and/or hazard, following the sludge guidelines by the WRC. These guidelines encourage the beneficial use of sludge while setting strict requirements for all disposal options. It can be used in agriculture or aquaculture, but not discharged indiscriminately into lanes, drainage ditches, onto open urban spaces and into inland waters, estuaries, or the sea, causing serious health impacts and water pollution.
 - (g) *Greywater re-use:* The storage, treatment and re-use of greywater shall be advocated and encouraged.

- (h) *Nutrient re-use*: The re-use of nutrients shall be encouraged.
 - (i) *Operation and maintenance*: The household is fully responsible for the capital, operation, maintenance and refurbishment actions and costs pertaining to on-site sanitation services, apart from when the services are provided as a basic sanitation service.
 - (j) *Hygiene promotion*: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
 - (k) *Asset management*: The services provider must account for all sanitation services assets in a way that ensures financial sustainability in an asset management plan as part of their WSDPs. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- (4) *Type of sanitation infrastructure/facility*: The type of sanitation facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

7.3.2 Off-site sanitation services

Off-site or reticulated sanitation refers to a system of sanitation where human waste is removed from the household or plot by a reticulation system, and transported to a sewage treatment works. Thus all wastewater (greywater and/or black water) created by households, institutions, industries and commercial establishments are collected, transported and treated without stream separation. The collection of black water occurs via high- or low-volume cistern-flush toilets, or pour-flush toilets. Black-water is mixed with household greywater as it leaves the house and the mixture (referred to as 'wastewater') is transported to a centralised off-site treatment plant (WSP, 2008).

Goal: Full concern for human health, environment and sustainability of interconnected systems.

Thus:

- (1) The function of a waterborne sanitation system is to collect and convey wastewater in a hygienic manner from residential, industrial or commercial sources and convey it to treatment facilities. Planners, designers, the construction team and the administrators have a joint duty in providing an efficient system that an operator can, based on the available resources provided, operate and maintain.
- (2) Municipal sanitary sewage collection and conveyance systems are an extensive, valuable and complex part of the country's infrastructure. The public expects these systems to function effectively at a reasonable cost.
- (3) The household or owner must adhere to the relevant by-laws of their local municipality regarding sewered sanitation systems. The household or owner of the sanitation facility is fully responsible for all capital, operation, maintenance and refurbishment actions and costs pertaining to the sanitation facility in the yard, unless it is provided as a free basic sanitation service in which case the local authority is responsible for these actions and costs.
- (4) *Wastewater treatment*:
 - (a) The treatment works must be able to handle the high volume of liquid required to convey the excreta. The quantity of water used (usually 6-10 litres per flush) can be reduced by using low-flush pans designed to flush efficiently with as little as three litres. Research has indicated that the operation of the sewer system is not adversely affected by low-volume flush toilets. In an area where water is costly or scarce, it may be counter-productive to purify water only to pollute it by conveying excreta to a treatment and disposal facility.

- (b) Proper wastewater disposal (properly built, covered and functioning soakaway pits/infiltration/ trenches/sewer system) must avoid contaminating groundwater (at least 1.5 m between the bottom of the infiltration system and the groundwater table, at least 50 m from any groundwater source). Wastewater (excluding wastewater from toilets) may be used to water gardens, if it does not create health risks.
 - (c) The principles of the Minimum Requirements that govern waste disposal in South Africa have been adopted for all land sludge disposal options, both on-site and off-site. The Minimum Requirements are updated periodically and the reader is referred to these documents, or any future updates of the documents, where necessary. However, this volume was developed recognising that the wastewater industry is not necessarily familiar with waste handling practices and the legal requirements thereof. Therefore, the basic principles of the Minimum Requirements were adopted for sludge disposal and included in the *Guidelines for the Utilisation and Disposal of Wastewater Sludge Volume 3: Requirements for the on-site and off-site disposal of sludge* to enable the wastewater industry to familiarise themselves with waste handling practices and, at the same time, comply with the waste disposal requirements. (Herselmann & Snyman, 2009).
 - (d) Most wastewater treatment plants will have site specific requirements for the quality of wastewater that can be discharged into the natural environment. The quality requirements are set and regulated by DWS in issuing permits/licenses.
- (5) Operation and maintenance: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The local authority/services provider is fully responsible for all capital, operation, maintenance and refurbishment actions and costs pertaining to the sewer system, making sure that all its components are kept in good operating condition.
- (6) Hygiene promotion: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- (7) Asset management: The services provider must account for all sanitation services assets in a way that ensures financial sustainability in an asset management plan as part of their WSDPs. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- (8) Types of sanitation infrastructure/facilities: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

8. Emergency sanitation services

An emergency is defined as a *situation declared as such in terms of a law and which is likely to cause injury or loss of life* (DWS, 2016). Slow on-set events, such as a drought, is not regarded as an emergency situation as people are not displaced from their normal abode and can carry on with relatively normal activities. The Minister reserves the right to declare a slow on-set event as an emergency for which emergency sanitation services should be provided.

The 2016 National Sanitation Policy states that emergency sanitation services may vary from area to area due to varying geographical and other conditions and that provision must be made for privacy to the user, safety, ready accessibility and proximity, safe disposal of human waste, and hygiene and end-user education. The Minister will determine acceptable timeframe for short-term, temporary interventions during emergencies and disasters.

Emergency sanitation services are immediate measures and tasks to be implemented after a natural or man-made disaster during which people were displaced and evacuated/relocated to a temporary settlement/refugee camp/dwelling.

Goal: People access pleasant, safe, reliable and adequately maintained improved toilets and handwashing facilities in close proximity to the temporary dwelling within 24 hours and for the duration of the emergency event.

- 1) Provision of sanitation in emergency situations must be a coordinated effort and budgeted for between all spheres of government and private institutions.
- 2) Emergency sanitation services must reflect the vulnerabilities, needs and preferences of the affected population.
- 3) Where appropriate, users shall be involved in the management and maintenance of emergency hygienic sanitation facilities.
- 4) Technical options for emergency situation excreta disposal shall be limited and simple. If they are to work, they must be properly managed and be understood and supported by the users.
- 5) Most of the options are only temporary. As soon as it becomes obvious that the users are likely to remain in their new location for any length of time, longer-term solutions should be sought. In most cases, some form of on-site sanitation will be most appropriate (WHO/WEDC, 2011).
- 6) *Shared facilities:*
 - a) Users should be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Clean toilets are more likely to be frequently used.
 - b) Efforts should be made to provide people living with chronic illnesses such as HIV and AIDS with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility.
 - c) Where possible, communal toilets should be provided with lighting, or household members provided with torches. The input of the community should be sought with regard to ways of enhancing the safety of users.
 - d) Sufficient numbers of toilets shall be made accessible:

Type	Toilet seats	Urinal units	Hand washing facility
Communal toilet	1 seat per 20 users	1 unit per 50 users	1 basin per 4 toilet seats
Shared toilet mostly used during working hours	1 seat per 50 users	1 unit per 200 users	1 basin per 10 toilet seats
Shared toilets mostly used at night	1 seat per 100 users	1 unit per 300 users	1 basin per 15 toilet seats

- 7) *Water and anal cleansing material:* Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
- 8) *Menstruation:* Women and girls of menstruating age should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate. Toilets should include provision for appropriate disposal of menstrual material or private washing facilities.
- 9) *Containment of children's faeces:* Give particular attention to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections). Parents and caregivers should be provided with information about safe disposal of infants' faeces, laundering practices and the use of nappies (diapers), potties or scoops for effectively managing safe disposal.

- 10) *Accessible to all*: It may not be possible to make all toilets acceptable to all groups, but special toilets need to be constructed for children, older people and persons with disabilities, e.g. toilets with kiddie seats, or hand rails, or provision of bed pans, potties or commodes.
- 11) *Operation and maintenance*: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The services provider is fully responsible for all operation and maintenance actions and costs pertaining to Emergency sanitation services.
- 12) *Types of sanitation infrastructure/facilities*: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.
- 13) In all cases, the sanitation facilities/infrastructure must comply to the following requirements:
- Sufficient sanitation facilities - enough to address needs
 - Easily accessible to all – convenient, comfortable and safe proximity and vicinity
 - Provide privacy and security - carefully located, lockable from the inside and well-lit if they are used at night, safe and secure for vulnerable groups (women, children, disabled, aged)
 - Appropriate - to local prevalent cultural and social conditions, and to users (pedestal/squat plate, sizing for children)
 - Hygienic to use and easy to clean - smooth, waterproof and hardwearing material minimising odours, and control the breeding of flies and mosquitoes,
 - Convenient handwashing facilities close by - with soap, water and adequate drainage. Users should have the means to wash their hands with soap or an alternative (such as ash) after using toilets, after cleaning the bottom of a child who has been defecating, and before eating and preparing food. There should be a constant source of water near the toilet for this purpose.
 - A cleaning and maintenance routine - at least once per day, with a disinfectant being used on all exposed surfaces
 - A cleaning and maintenance agreement – maintained and serviced by the services provider on a weekly basis. When appropriate, and depending on the need, desludging of toilets/septic tanks and excreta containers, including siting of final sewage disposal point, needs to be considered and included in the planning of services provision.
 - Proper wastewater disposal - properly built, covered and functioning soakaway pits/infiltration trenches/ sewer system, avoid contaminating groundwater (at least 1.5 m between the bottom of the infiltration system and the groundwater table, at least 50 m from any groundwater source). Wastewater (excluding wastewater from toilets) may be used to water gardens, if it does not create health risks.

9. Sanitation services to private land

Conditions set by the 2016 National Sanitation Policy are: *Ownership of sanitation assets provided on private land may pass into the hands of the person owning the land in the following circumstances (1) where an “on-site” sanitation facility is provided to a household; and (2) where assets are required for services to consumers served by a water services intermediary who owns the land on which the consumers reside and where that intermediary has made an appropriate contribution to financing the cost of the assets.*

A Water Service Authority has a responsibility to ensure basic sanitation services are provided to individuals living on privately owned land. The DWS defines privately-owned land as mainly:

- Commercial farms
- Mine owned land

- Church owned land
- Industrial owned land including privately owned enterprises
- Sectional title / residential complexes & estates
- Tribal and communal owned land
- Game parks

Goal: People living on privately owned land access pleasant, safe, reliable and adequately maintained improved toilets and handwashing facilities in close proximity to the dwelling. Maintenance is the responsibility of the landowner once the services authority provided on-site sanitation infrastructure.

- (1) Sanitation services provision on privately owned land shall be provided at the basic level as part of an integrated basket of services to those individuals.
- (2) Sanitation services shall be provided per household on privately owned land, including to back yard dwellers.
- (3) Each household on the privately owned land shall be individually metered and tariffed.
- (4) Land owners shall keep up to date records of all households receiving sanitation services on their properties.
- (5) Sanitation services shall ensure that sufficient toilets are available: The number of toilets and urinals required for each place depends on the numbers of people in the area on a daily basis. The maximum number of toilets must be provided within the budget constraints.
 - (a) Male and female facilities must be in separate toilet blocks, or toilet areas separated by solid walls (not lightweight partitions) and must have separate entrances.
 - (b) Provision must be made for toilets for people and educators living with disabilities. At least one toilet cubicle must be accessible people living with disabilities, one for females and one for males. This includes level or ramped access, a wide door and sufficient space inside for a wheelchair user or helper to manoeuvre, and the provision of support structures such as a handrail and a toilet seat.
- (6) Sanitation services shall ensure that toilets are easily accessible to all: Toilets must be as close as possible to ensure that they can be used conveniently and safely.
 - (a) Entrances must be positioned to provide maximum privacy in entering and leaving a toilet block.
 - (b) The location of toilets must consider the need to minimise odours (taking account of prevailing winds) and avoid contamination of water supplies and food.
- (7) Sanitation services shall ensure that toilets provide privacy and security: To minimise the risk of violence, including sexual violence, and to ensure sufficient privacy, toilets must be
 - (a) carefully located,
 - (b) the toilets and access routes should be lit if they are used at night
 - (c) lockable from the inside (to protect people while using them) but should be left unlocked when not in use, to ensure accessible at all times.
- (8) Sanitation services shall ensure that toilets are appropriate to local cultural and social conditions, and to users: Different cultures may require toilets of different dimensions (sitting vs squatting), and specific features need to be taken into account to make the toilets easy and comfortable to use. Toilets must be safe and secure for use by all cultures.
- (9) Sanitation services shall ensure that toilets are hygienic to use and easy to clean: Toilets must be designed and built so that they are hygienic to use and do not become centres for disease transmission. Surfaces that may be soiled must be of smooth, waterproof and hardwearing material that can be cleaned with water and is resistant to cleaning products. The design of the toilet must include measures to minimise odours, and control the breeding of flies and mosquitoes.
- (10) Sanitation services shall ensure that toilets have convenient handwashing facilities close by: A toilet is not complete without a handwashing point with soap, water and adequate drainage. All toilet designs must include convenient handwashing facilities so that handwashing after using the toilet becomes a routine activity.

- (11) Sanitation services shall ensure that water and anal cleansing material is available: Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
- (12) Sanitation services shall ensure that menstruation is considered: Women and girls of menstruating age should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate. Toilets must include provision for appropriate disposal of menstrual material or private washing facilities.
- (13) Sanitation services shall ensure that a cleaning and maintenance routine is in operation: Toilets must be cleaned, whenever they are dirty and at least once per day, with a disinfectant being used on all exposed surfaces. Strong disinfectants should not be used in large quantities, because this is unnecessary, expensive, potentially dangerous, and may damage the sanitation system. If no disinfectant is available, plain cold water must be used with a brush to remove visible soiling.
- (14) Sanitation services shall ensure appropriate wastewater disposal: Public places may produce wastewater from handwashing points, flushing toilets, showers, kitchens and laundries.
- A properly built and functioning sewer system is the most appropriate wastewater disposal option for public places in urban areas.
 - In other situations, soakaway pits or infiltration trenches must be used. These must be equipped with grease traps, which must be checked weekly, and cleaned (if necessary) to ensure that the systems operate correctly.
 - All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30m from any groundwater source.
 - All wastewater drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.
 - Wastewater (excluding wastewater from toilets) may be used to water a garden, provided it is done in a way that does not create health risks. Local environmental health staff should be asked to advise on use of wastewater.
- (15) Sanitation services shall ensure appropriate sludge disposal:
- A properly built and functioning sewer system is the most appropriate wastewater and sludge disposal option in urban areas.
 - In other situations, soakaway pits or infiltration trenches must be used. All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source.
 - All sludge drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.
 - Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections).
- (16) Sanitation services shall ensure appropriate solid waste disposal: Effective management of healthcare waste consists of good segregation of the hazardous component from the non-hazardous component and, where possible, further segregation of the non-hazardous components for re-use and/or recycling. The requirements and guidelines of the Department of Health are applicable and must be adhered to, such as the May 2014 *Infrastructure Design for Waste Management in Healthcare Facilities* (Department of Health, 2014).
- (17) Operation and maintenance: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The land owner is fully responsible for the capital, operation, maintenance and

- refurbishment actions and costs pertaining to sanitation services, unless it is provided as a free basic service where the services provider is responsible for the maintenance costs.
- (18)Hygiene promotion: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- (19)Asset management: The land or farm owner must account for all sanitation services assets in a way that ensures financial sustainability. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- (20)Types of sanitation infrastructure/facilities: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

10. Sanitation services to public institutions and places

The 2016 National Sanitation Policy defines public institutions as including (but not limited to) *schools, academic institutions, clinics, hospitals, crèches and day-care centres, libraries, old-age homes, churches, sporting facilities, police stations and correctional facilities, and public areas and public spaces*. The policy also states that all public institutions are responsible to provide sanitation services. Sanitation services at public institutions must include hand washing facilities, hygiene and end-user education.

The minimum water quantities needed for sanitation at public places and institutions are the following:

Places	Minimum water requirements for sanitation
Educational centres	3 L per person per day for drinking and hand washing 2 – 8 L per toilet cubicle per day for cleaning 3 – 5 L per person per day for pour-flush toilets 20 – 40 L per person per day in the case of flushing toilets connected to a sewer
Child and health care centres	5 L per day per out-patient 40 – 60 L per day per in-patient 3 – 5 L per person per day for pour-flush toilets 15 L per carer per day 20 – 40 L per person per day in the case of flushing toilets connected to a sewer 100 L per day for laundry, cleaning, etc.
Public toilets	1 – 2 L per person per day for hand washing 1 -2 L per person per day for anal cleansing 2 – 8 L per day per toilet for toilet cleaning 3 – 5 L per person per day for pour-flush toilets 20 – 40 L per person per day in the case of flushing toilets connected to a sewer

10.1 Sanitation services for schools and academic institutions

No school, or academic institution is allowed to function without adequate sanitation facilities.

Goal: Learners and staff access pleasant, safe, reliable and adequately maintained improved toilets and handwashing facilities on the premises, at all times. Maintenance is the responsibility of the school/academic institution.

- (1) All schools shall be provided with adequate sanitation facilities that promote health and hygiene standards that comply with the National Building Regulations (South Africa, 1977) and Water Service Act, (Act 108 of 1997).
- (2) The choice of appropriate sanitation infrastructure shall be made after all environmental assessments have been made. Plain pit and bucket latrines shall not be acceptable.
- (3) Sanitation services shall ensure that sufficient toilets are available:
 - (a) The number of toilets and urinals required for each school depends on the numbers of children and staff but also on when the schoolchildren and staff have access to the toilets. The maximum number of toilets must be provided within the budget constraints. The numbers of toilets must adhere to the requirements set out in Table 6 of the 2009 *National Minimum Uniform Norms and Standards for School Infrastructure Vol 1* of the Department of Education (2009), where:
 - o Primary School : 1 toilet per 25 learners but not more than 35 learners per toilet.
 - o Secondary School : 1 toilet per 20 learners but not more than 30 learners per toilet.
 - o Staff: 1 toilet per 15 female staff and 1 toilet and 1 urinal per 10 male staff.
 - o At least one toilet cubicle must be accessible for staff, learners and visitors living with disabilities, one for females and one for males.
 - o Handwashing basins with soap and water in or near the toilet at a ration of 1 basin per 5 toilets.
 - (b) Boys' and girls' facilities must be in separate toilet blocks, or toilet areas separated by solid walls (not lightweight partitions), located not more than 30m from users and must have separate entrances. Doors should reach down to floor level.
 - (c) Separate toilets for staff and schoolchildren must be provided. At least one toilet cubicle must be accessible for staff and children with disabilities, one for females and one for males. This includes level or ramped access, a wide door and sufficient space inside for a wheelchair user or helper to manoeuvre, and the provision of support structures such as a handrail and a toilet seat.
 - (d) If the school has no formal toilet facilities, it is probably best to improve the existing system (e.g. defecation fields) and continue using that system until a sufficient number of toilets are available to provide accessible and hygienic facilities for everyone.
 - (e) If just one or two pit toilets are provided for a whole school, the area around them is likely to rapidly become contaminated, and the pits to fill in a short time. Defecation areas can be improved by using fixed place defecation, such as shallow trench toilets, rather than open defecation, providing correct drainage to avoid contaminating the nearby environment, and setting up a rotation system.
- (4) Sanitation services shall ensure that toilets are easily accessible to all: Toilets must be as close as possible to classrooms and playing areas, to ensure that they can be used conveniently and safely. Entrances must be positioned to provide maximum privacy in entering and leaving a toilet block. The location of toilets must consider the need to minimise odours (taking account of prevailing winds) and avoid contamination of water supplies and food. All toilets and infiltration systems must be located at least 50m from any groundwater source, and at least 1.5 m above the groundwater table (Franceys, *et.al*, 1992). Provision must be made for toilets for learners and educators living with disabilities.
- (5) Sanitation services shall ensure that toilets provide privacy and security: To minimise the risk of violence, including sexual violence, and to ensure sufficient privacy, toilets must be carefully located, and they and their access routes should be lit if they are used at night. Toilets should be

- lockable from the inside (to protect people while using them) but should be left unlocked when not in use, to ensure accessible at all times.
- (6) Sanitation services shall ensure that toilets are appropriate to local cultural and social conditions, and to users: The cultural and social conditions prevalent in the community to which the schoolchildren belong should be taken into account in the design and siting of toilets for schools. Segregation of boys' and girls' toilets is something that parents often require. Younger children may require toilets of different dimensions than older children and adults, and specific features need to be taken into account to make the toilets easy and comfortable to use. Toilets must be safe and secure for use by children.
 - (7) Sanitation services shall ensure that toilets are hygienic to use and easy to clean: Toilets must be designed and built so that they are hygienic to use and do not become centres for disease transmission. Surfaces that may be soiled must be of smooth, waterproof and hardwearing material that can be cleaned with water and is resistant to cleaning products. The design of the toilet must include measures to minimise odours, and control the breeding of flies and mosquitoes.
 - (8) Sanitation services shall ensure that toilets have convenient handwashing facilities close by: A toilet is not complete without a handwashing point with soap, water and adequate drainage. All toilet designs must include convenient handwashing facilities so that handwashing after using the toilet becomes a routine activity for schoolchildren and teachers. Effective handwashing facilities could be built at little cost, with locally available materials.
 - (9) Sanitation services shall ensure that adequate water and anal cleansing material is available: Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
 - (10) Sanitation services shall ensure that menstruation is considered: Women and girls of menstruating age should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate. Toilets should include provision for appropriate disposal of menstrual material or private washing facilities.
 - (11) Sanitation services shall ensure that a cleaning and maintenance routine is in operation: Toilets must be cleaned, whenever they are dirty and at least once per day, with a disinfectant being used on all exposed surfaces. Strong disinfectants should not be used in large quantities, because this is unnecessary, expensive, potentially dangerous, and may damage the sanitation system. If no disinfectant is available, plain cold water must be used with a brush to remove visible soiling.
 - (12) Sanitation services shall ensure proper wastewater disposal: Schools may produce wastewater from handwashing points, flushing toilets, showers, kitchens, laundries and laboratories. All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. All wastewater drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination. Wastewater (excluding wastewater from toilets) may be used to water a school garden, provided it is done in a way that does not create health risks. Local environmental health staff should be asked to advise on use of wastewater.
 - (13) Sanitation services shall ensure proper solid waste disposal: Effective management of solid waste and re-use/recycling, adhering to the requirements of the Waste Management Act (South Africa, 2008b) and the relevant strategies and guidelines. Waste bins with lids in female toilets must be supplied.
 - (14) Sanitation services shall ensure that wastewater and nutrient re-use is considered: Some schools may have gardens that can be used for teaching and for food production. In such cases, it might be beneficial to use composting or dehydrating toilets (EcoSan toilets), so that human wastes can eventually be used as fertiliser, and to demonstrate this appropriate technology. In this situation, local environmental health staff must advise on how to use composting or dehydrating toilets without creating health risks.

- (15) Hygiene promotion: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- (16) Operation and maintenance: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The educational centre is fully responsible for the capital, operation, maintenance and refurbishment actions and costs pertaining to sanitation services, unless it is provided as a free basic service where the services provider is responsible for the maintenance costs.
- (17) Asset management: The educational centre must account for all sanitation services assets in a way that ensures financial sustainability. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- (18) Types of sanitation infrastructure/facilities: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

10.2 Sanitation services for clinics, hospitals, crèches and day-care centres

No clinic, hospital, crèche, or day-care centre is allowed to function without adequate sanitation facilities.

Goal: Children, patients and staff access pleasant, safe, reliable and adequately maintained improved toilets and handwashing facilities on the premises.
Maintenance is the responsibility of the child/health care centre.

- 1) Adequate ablution and toilet facilities at ratios set out in the National Building Regulations (South Africa, 1977) (Regulation R158 - Regulation Governing Patient Care Facilities) shall be provided for use by patients and staff. The following ratios are applicable:
 - (a) 1 toilet for every 20 users for in-patient setting.
 - (b) At least 4 toilets per out-patient setting.
 - (c) At least one toilet cubicle must be accessible for staff and children or patients with disabilities, one for females and one for males.
 - (d) Handwashing basins with soap and water in or near the toilet.
- 2) A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is required, and the toilets must be at least 30 m from any groundwater source.
- 3) Sanitation services shall ensure that sufficient toilets are available: The number of toilets and urinals required for each centre depends on the numbers of children, patients and staff.
 - (a) The maximum number of toilets shall be provided within the budget constraints.
 - (b) Male and female facilities shall be in separate toilet blocks, or toilet areas separated by solid walls (not lightweight partitions) and shall have separate entrances.
 - (c) At least one toilet cubicle shall be accessible for staff and children or patients with disabilities, one for females and one for males. This includes level or ramped access, a wide door and sufficient space inside for a wheelchair user or helper to manoeuvre, and the provision of support structures such as a handrail and a toilet seat.
 - (d) Female facilities shall have waste bins with to enable appropriate disposal of menstrual materials.
- 4) Sanitation services shall ensure that toilets are easily accessible to all:
 - (a) Toilets shall be as close as possible to the centre to ensure that they can be used conveniently and safely.
 - (b) Entrances shall be positioned to provide maximum privacy in entering and leaving a toilet block.

- (c) In child care facilities, toilets may need to be adjacent to the child care space, because young children frequently need supervision when going to the toilet.
 - (d) The location of toilets shall consider the need to minimise odours (taking account of prevailing winds) and avoid contamination of water supplies and food.
 - (e) Provision shall be made for toilets for learners and educators living with disabilities.
- 5) Sanitation services shall ensure that toilets provide privacy and security: To minimise the risk of violence, including sexual violence, and to ensure sufficient privacy, toilets must be carefully located, and they and their access routes should be lit if they are used at night. Toilets should be lockable from the inside (to protect people while using them) but should be left unlocked when not in use, to ensure accessible at all times.
 - 6) Sanitation services shall ensure that toilets are appropriate to local cultural and social conditions, and to users: Younger children and frail patients may require toilets of different dimensions than staff and adults, and specific features need to be taken into account to make the toilets easy and comfortable to use. Toilets must be safe and secure for use by children and the sick.
 - 7) Sanitation services shall ensure that toilets are hygienic to use and easy to clean: Toilets must be designed and built so that they are hygienic to use and do not become centres for disease transmission. Surfaces that may be soiled must be of smooth, waterproof and hardwearing material that can be cleaned with water and is resistant to cleaning products. The design of the toilet must include measures to minimise odours, and control the breeding of flies and mosquitoes.
 - 8) Sanitation services shall ensure that toilets have convenient handwashing facilities close by: A toilet is not complete without a handwashing point with soap, water and adequate drainage. All toilet designs must include convenient handwashing facilities so that handwashing after using the toilet becomes a routine activity.
 - 9) Sanitation services shall ensure that water and anal cleansing material is made available: Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
 - 10) Sanitation services shall ensure that menstruation is considered: Women and girls of menstruating age should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate. Toilets should include provision for appropriate disposal of menstrual material or private washing facilities.
 - 11) Sanitation services shall ensure that a cleaning and maintenance routine is in operation: Toilets must be cleaned, whenever they are dirty and at least once per day, with a disinfectant being used on all exposed surfaces. Strong disinfectants should not be used in large quantities, because this is unnecessary, expensive, potentially dangerous, and may damage the sanitation system. If no disinfectant is available, plain cold water must be used with a brush to remove visible soiling.
 - 12) Sanitation services shall ensure appropriate wastewater disposal: Clinics, hospitals, crèches, or day-care centres may produce wastewater from handwashing points, flushing toilets, showers, kitchens, laundries and laboratories.
 - (a) A properly built and functioning sewer system is the most appropriate wastewater disposal option in urban areas.
 - (b) In other situations, soakaway pits or infiltration trenches must be used. These must be equipped with grease traps, which must be checked weekly, and cleaned (if necessary) to ensure that the systems operate correctly.
 - (c) All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source (Harvey, et.al, 2002).
 - (d) All wastewater drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.

- (e) Wastewater (excluding wastewater from toilets) may be used to water a garden, provided it is done in a way that does not create health risks. Local environmental health staff should be asked to advise on use of wastewater.
- 13) Sanitation services shall ensure appropriate sludge disposal:
- (a) A properly built and functioning sewer system is the most appropriate wastewater disposal option in urban areas. In other situations, soakaway pits or infiltration trenches must be used.
 - (b) All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source.
 - (c) All sludge drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.
 - (d) Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections).
- 14) Sanitation services shall ensure appropriate solid waste disposal: Effective management of healthcare waste consists of good segregation of the hazardous component from the non-hazardous component and, where possible, further segregation of the non-hazardous components for re-use and/or recycling. The requirements and guidelines of the Department of Health are applicable and must be adhered to, such as the May 2014 *Infrastructure Design for Waste Management in Healthcare Facilities* (Department of Health, 2014).
- 15) Operation and maintenance: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The clinic, hospital, crèche, or day-care centre is fully responsible for the capital, operation, maintenance and refurbishment actions and costs pertaining to sanitation services, unless it is provided as a basic service where the services provider is responsible for the maintenance costs.
- 16) Hygiene promotion: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- 17) Asset management: The clinic, hospital, crèche, or day-care centre must account for all sanitation services assets in a way that ensures financial sustainability. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- 18) Types of sanitation infrastructure/facilities: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.
- 19) Charging for use: A nominal charge for each use by out-patients and visitors may be required in order to cover the costs for use, cleaning and maintenance materials.

10.3 Sanitation services for libraries, old-age homes, churches, cemeteries, sporting facilities, police stations and correctional facilities.

No library, old-age home, church, cemetery, sporting facility, police station, or correctional facility is allowed to function without adequate sanitation facilities.

Goal: People access pleasant, safe, reliable and adequately maintained improved toilets and handwashing facilities in close proximity to the main building. Maintenance is the responsibility of the public institution.

- 1) In libraries, old-age homes, churches, cemeteries, sporting facilities, police stations and correctional facilities, toilets shall be provided with established systems for proper and regular cleaning and maintenance. Disaggregated population data shall be used to plan the number of women's cubicles to men's using an approximate ration of 3:1. Where possible, urinals shall be provided.

Type	Toilet seats	Urinal units	Hand washing facility
Toilet mostly used all the time	1 seat per 50 users	1 unit per 200 users	1 basin per 10 toilet seats
Toilets used mostly during working hours	1 seat per 100 users	1 unit per 300 users	1 basin per 15 toilet seats

- 2) Sanitation services shall ensure that sufficient toilets are available: The number of toilets and urinals required for each library, old-age home, church, cemetery, sporting facility, police station or correctional facility depends on the numbers of people in the institution on a daily basis. The maximum number of toilets shall be provided within the budget constraints.
 - (a) Male and female facilities shall be in separate toilet blocks, or toilet areas separated by solid walls (not lightweight partitions) and shall have separate entrances.
 - (b) Provision shall be made for toilets for people and educators living with disabilities. At least one toilet cubicle shall be accessible people living with disabilities, one for females and one for males. This includes level or ramped access, a wide door and sufficient space inside for a wheelchair user or helper to manoeuvre, and the provision of support structures such as a handrail and a toilet seat.
- 3) Sanitation services shall ensure that toilets are easily accessible to all: Toilets must be as close as possible to ensure that they can be used conveniently and safely.
 - (a) Entrances shall be positioned to provide maximum privacy in entering and leaving a toilet block.
 - (b) The location of toilets must consider the need to minimise odours (taking account of prevailing winds) and avoid contamination of water supplies and food.
- 4) Sanitation services shall ensure that toilets provide privacy and security: To minimise the risk of violence, including sexual violence, and to ensure sufficient privacy, toilets must be
 - (a) carefully located,
 - (b) the toilets and access routes should be lit if they are used at night
 - (c) lockable from the inside (to protect people while using them) but should be left unlocked when not in use, to ensure accessible at all times.
- 5) Sanitation services shall ensure that toilets are appropriate to local cultural and social conditions, and to users: Different cultures may require toilets of different dimensions (sitting vs squatting), and specific features need to be taken into account to make the toilets easy and comfortable to use. Toilets must be safe and secure for use by all cultures, ages and abilities.
- 6) Sanitation services shall ensure that toilets are hygienic to use and easy to clean: Toilets must be designed and built so that they are hygienic to use and do not become centres for disease transmission. Surfaces that may be soiled must be of smooth, waterproof and hardwearing material that can be cleaned with water and is resistant to cleaning products. The design of the toilet must include measures to minimise odours, and control the breeding of flies and mosquitoes.
- 7) Sanitation services shall ensure that toilets have convenient handwashing facilities close by: A toilet is not complete without a handwashing point with soap, water and adequate drainage. All toilet designs must include convenient handwashing facilities so that handwashing after using the toilet becomes a routine activity.

- 8) Sanitation services shall ensure that water and anal cleansing material is available: Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
- 9) Sanitation services shall ensure that menstruation is considered: Women and girls of menstruating age should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate. Toilets must include provision for appropriate disposal of menstrual material or private washing facilities.
- 10) Sanitation services shall ensure that a cleaning and maintenance routine is in operation: Toilets must be cleaned, whenever they are dirty and at least once per day, with a disinfectant being used on all exposed surfaces. Strong disinfectants should not be used in large quantities, because this is unnecessary, expensive, potentially dangerous, and may damage the sanitation system. If no disinfectant is available, plain cold water must be used with a brush to remove visible soiling.
- 11) Sanitation services shall ensure appropriate wastewater disposal: Libraries, old-age homes, churches, cemeteries, sporting facilities, police stations, or correctional facilities may produce wastewater from handwashing points, flushing toilets, showers, kitchens, laundries and laboratories.
 - (a) A properly built and functioning sewer system is the most appropriate wastewater disposal option for public places in urban areas.
 - (b) In other situations, soakaway pits or infiltration trenches must be used. These must be equipped with grease traps, which must be checked weekly, and cleaned (if necessary) to ensure that the systems operate correctly.
 - (c) All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source.
 - (d) All wastewater drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.
 - (e) Wastewater (excluding wastewater from toilets) may be used to water a garden, provided it is done in a way that does not create health risks. Local environmental health staff should be asked to advise on use of wastewater.
- 12) Sanitation services shall ensure appropriate sludge disposal:
 - (a) A properly built and functioning sewer system is the most appropriate wastewater and sludge disposal option in urban areas.
 - (b) In other situations, soakaway pits or infiltration trenches must be used. All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source.
 - (c) All sludge drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.
 - (d) Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections).
- 13) Sanitation services shall ensure appropriate solid waste disposal: Effective management of solid waste and re-use/recycling, adhering to the requirements of the Waste Management Act (2008b) and the relevant strategies and guidelines. Waste bins with lids in female toilets must be supplied.
- 14) Hygiene promotion: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.

- 15) Operation and maintenance: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The library, old-age home, church, cemetery, sporting facility, police station, or correctional facility is fully responsible for the capital, operation, maintenance and refurbishment actions and costs pertaining to sanitation services, unless it is provided as a basic service where the services provider is responsible for the maintenance costs.
- 16) Asset management: The library, old-age home, church, cemetery, sporting facility, police station, or correctional facility must account for all sanitation services assets in a way that ensures financial sustainability. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- 17) Types of sanitation infrastructure/facilities: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.

10.4 Sanitation services for public spaces

No public space is allowed to function or be used without adequate sanitation facilities.

Goal: People access pleasant, safe, reliable and adequately maintained improved toilets and handwashing facilities in close proximity to the main building. **Maintenance** is the responsibility of the services provider.

- 1) In public places (public toilets, recreational areas, beaches, taxi ranks, bus stations, train stations, etc) toilets shall be provided with established sanitation systems for proper and regular cleaning and maintenance. Disaggregated population data shall be used to plan the number of women's cubicles to men's using an approximate ration of 3:1. Where possible, urinals shall be provided.

Type	Toilet seats	Urinal units	Hand washing facility
Public toilet mostly used all the time	1 seat per 50 users	1 unit per 200 users	1 basin per 10 toilet seats
Public toilets mostly used during working hours	1 seat per 100 users	1 unit per 300 users	1 basin per 15 toilet seats

- 2) Sanitation services shall ensure that sufficient toilets are available: The number of toilets and urinals required for each public space depends on the numbers of people in the area on a daily basis. The maximum number of toilets shall be provided within the budget constraints.
- (a) Male and female facilities shall be in separate toilet blocks, or toilet areas separated by solid walls (not lightweight partitions) and shall have separate entrances.
- (b) Provision shall be made for toilets for people and educators living with disabilities. At least one toilet cubicle shall be accessible people living with disabilities, one for females and one for males. This includes level or ramped access, a wide door and sufficient space inside for a wheelchair user or helper to manoeuvre, and the provision of support structures such as a handrail and a toilet seat.
- 3) Sanitation services shall ensure that toilets are easily accessible to all: Toilets must be as close as possible to ensure that they can be used conveniently and safely.
- (a) Entrances shall be positioned to provide maximum privacy in entering and leaving a toilet block.

- (b) The location of toilets must consider the need to minimise odours (taking account of prevailing winds) and avoid contamination of water supplies and food.
- 4) Sanitation services shall ensure that toilets provide privacy and security: To minimise the risk of violence, including sexual violence, and to ensure sufficient privacy, toilets must be
 - (a) carefully located,
 - (b) the toilets and access routes should be lit if they are used at night
 - (c) lockable from the inside (to protect people while using them) but should be left unlocked when not in use, to ensure accessible at all times.
 - 5) Sanitation services shall ensure that toilets are appropriate to local cultural and social conditions, and to users: Different cultures may require toilets of different dimensions (sitting vs squatting), and specific features need to be taken into account to make the toilets easy and comfortable to use. Toilets must be safe and secure for use by all cultures.
 - 6) Sanitation services shall ensure that toilets are hygienic to use and easy to clean: Toilets must be designed and built so that they are hygienic to use and do not become centres for disease transmission. Surfaces that may be soiled must be of smooth, waterproof and hardwearing material that can be cleaned with water and is resistant to cleaning products. The design of the toilet must include measures to minimise odours, and control the breeding of flies and mosquitoes.
 - 7) Sanitation services shall ensure that toilets have convenient handwashing facilities close by: A toilet is not complete without a handwashing point with soap, water and adequate drainage. All toilet designs must include convenient handwashing facilities so that handwashing after using the toilet becomes a routine activity.
 - 8) Sanitation services shall ensure that water and anal cleansing material is available: Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
 - 9) Sanitation services shall ensure that menstruation is considered: Women and girls of menstruating age should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate. Toilets must include provision for appropriate disposal of menstrual material or private washing facilities.
 - 10) Sanitation services shall ensure that a cleaning and maintenance routine is in operation: Toilets at public places (public toilets, recreational areas, beaches, taxi ranks, bus stations, train stations, etc) must be cleaned, whenever they are dirty and at least once per day, with a disinfectant being used on all exposed surfaces. Strong disinfectants should not be used in large quantities, because this is unnecessary, expensive, potentially dangerous, and may damage the sanitation system. If no disinfectant is available, plain cold water must be used with a brush to remove visible soiling.
 - 11) Sanitation services shall ensure appropriate wastewater disposal: Public places (public toilets, recreational areas, beaches, taxi ranks, bus stations, train stations, etc) may produce wastewater from handwashing points, flushing toilets, showers, kitchens, laundries and laboratories..
 - (a) A properly built and functioning sewer system is the most appropriate wastewater disposal option for public places in urban areas.
 - (b) In other situations, soakaway pits or infiltration trenches must be used. These must be equipped with grease traps, which must be checked weekly, and cleaned (if necessary) to ensure that the systems operate correctly.
 - (c) All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source.
 - (d) All wastewater drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.

- (e) Wastewater (excluding wastewater from toilets) may be used to water a garden, provided it is done in a way that does not create health risks. Local environmental health staff should be asked to advise on use of wastewater.
- 12) Sanitation services shall ensure appropriate sludge disposal:
- (a) A properly built and functioning sewer system is the most appropriate wastewater and sludge disposal option in urban areas.
 - (b) In other situations, soakaway pits or infiltration trenches must be used. All systems that infiltrate wastewater into the ground must be sited to avoid contaminating groundwater. A distance of at least 1.5 m between the bottom of the infiltration system and the groundwater table is necessary, and the system must be at least 30 m from any groundwater source.
 - (c) All sludge drainage systems must be covered to avoid the risks of disease-vector breeding and direct contamination.
 - (d) Particular attention must be paid to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections).
- 13) Sanitation services shall ensure appropriate solid waste disposal: Effective management of solid waste and re-use/recycling, adhering to the requirements of the Waste Management Act (2008b) and the relevant strategies and guidelines shall be put in place. Waste bins with lids in female toilets must be supplied.
- 14) Hygiene promotion: A municipality as part of local government, through its Environmental Health Practitioners (EHPs) is responsible for promoting health and hygiene awareness, for ensuring an environmentally safe approach to sanitation, and for monitoring the impact of sanitation processes on the environment.
- 15) Operation and maintenance: Operations and maintenance are the activities related to the performance of routine, preventative, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety. The services provider is fully responsible for the capital, operation, maintenance and refurbishment actions and costs pertaining to sanitation services at public places (public toilets, recreational areas, beaches, taxi ranks, bus stations, train stations, etc).
- 16) Asset management: The services provider must account for all sanitation services assets in a way that ensures financial sustainability. All assets must be taken into account when calculating the current and future financial requirements for the replacement and refurbishment.
- 17) Types of sanitation infrastructure/facilities: The type of sanitation infrastructure or facility adopted and installed must be an improved facility and depends on the preferences and cultural habits of the intended users, the capacity of the services provider (financial and skills), the existing infrastructure, the availability of water (for flushing and water seals), the soil formation (for groundwater and surface water protection) and the capacity of the applicable wastewater treatment methods.
- 18) Charging for use: A nominal charge for each use by the public may be required in order to cover the costs for use, cleaning and maintenance materials.

11. Appropriate and improved sanitation infrastructure and facilities

The 2016 National Sanitation Policy states that a basic sanitation facility is “*the infrastructure necessary to provide an **appropriate** sanitation facility which **considers natural (water; land; topography) resource constraints**, is safe including for children, reliable, private, **socially acceptable, maintainable locally**, protected from the weather and ventilated, keeps smells to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests, **facilitates hand washing** and enables safe and appropriate treatment and/or removal of human waste and wastewater in an environmentally sound manner*”, and a basic sanitation service is “*the provision of an*

*appropriate basic sanitation facility which is **environmental sustainable**, easily accessible to a household, the sustainable operation of the facility, including the safe removal of human waste, **greywater** and wastewater from the premises where this is appropriate and necessary, and the communication and local monitoring of good sanitation, hygiene and related practices”.*

The DWS defined appropriate technology as the “sustainable application or operation of a technology (process, tool and/or device) to meet national imperatives within the local institutional, financial, social, cultural, ethical, economic and environmental requirements and constraints experienced by the authority or consumer responsible for the technology“ and refers to *conventional, alternative and intermediate technologies that are appropriate to the specific time and place, and which meet context-specific criteria and key characteristics* (DWS, 2014). Appropriate sanitation technologies minimise natural resource use, minimising impacts on water resources, minimise negative impacts on the environment, encourages recycling and re-use, are sensitive to people with special needs, children, the elderly and women, and consider the physical, social, cultural, environmental, institutional and economic context.

Goal: People have adequate, appropriate and acceptable toilet and hand washing facilities to allow rapid, safe and secure access at all times.

- 1) A services authority shall provide the most cost effective infrastructure and facilities that are affordable taking into account:
 - (a) Institutional capacity;
 - (b) User preferences and affordability; and
 - (c) Environmental protection and sustainability requirements.
- 2) A services authority must ensure that infrastructure and facilities are designed, built and located to meet the following requirements:
 - (a) Accessibility by all users;
 - (b) Security and privacy of all users, at all times, especially women and girls;
 - (c) Sufficiently simple and easy to use;
 - (d) Provisions are made for hygiene as necessary;
 - (e) Allowance for comfortable and hygienic disposal of women’s menstrual hygiene materials;
 - (f) Sufficient vector control; and
 - (g) Mechanisms for desludging, transport and appropriate disposal in the event that the toilets are sealed or are for long-term use and there is a need to empty them.
- 3) A service provider may select any appropriate facility in the market. A service authority must however ensure that all infrastructure and facilities adhere to the provisions outlined below:
 - (a) Drop and store facilities:
 - i. The facility shall be constructed complying with approved national guidelines, including the provision of sufficient lighting and privacy.
 - ii. The facility should provide complete separation of the human waste from contact at all times.
 - iii. Adequate measures shall be taken for fly and other vector control.
 - iv. Appropriate and acceptable measures shall be taken to protect the surrounding environment, notably the groundwater resource.
 - v. Appropriate and acceptable arrangements shall be put in place for the disposal of the waste (off- site/ when facility is full).
 - (b) Ecological sanitation:
 - i. The facility is appropriately designed for the ease of use, convenience and comfort of all user groups.
 - ii. There is effective containment of waste from the toilet facility throughout the service chain.
 - iii. All construction adheres to applicable national provisions, quality and guidelines.

- iv. Care and measures are taken to ensure that the products are suitable for the intended beneficiation purposes. If separation is required, this must be achieved effectively.
 - v. All aspects of re-use, including but not limited to cultural and religious acceptability, mechanisms of the facility, beneficiation process and products are acceptable to the service users.
 - vi. The technology and any associated processes do not cause any harm to the environmental resources, throughout the service chain, including the beneficiation processes and products.
 - vii. All proceeds from the beneficiation are shared equitably amongst stakeholders, including users of the sanitation service.
 - viii. Decommissioned on unused sanitation systems/facilities shall be well covered and made safe.
- (c) On-site waterborne sanitation technologies/systems:
- i. All construction adheres to applicable national provisions, quality and guidelines.
 - ii. The system provides for effective containment of waste throughout the service chain.
 - iii. All effluent conforms to the applicable requirements for discharge.
 - iv. If there is re-use; the provisions as set out in the previous section will apply.
 - v. Decommissioned on unused sanitation systems/facilities shall be well covered and made safe.
 - vi. There is efficient use of water in the technology and wherever possible the use of freshwater is kept to a minimum.
- (d) Off-site waterborne sanitation technologies/systems:
- i. All construction adheres to applicable national provisions, quality and guidelines.
 - ii. The system provides for effective containment of waste throughout the service chain.
 - iii. The system ensures uninterrupted transport of wastewater from site immediately after excrement.
 - iv. If there is re-use; the provisions as set out in the previous section will apply.
 - v. Decommissioned on unused sanitation systems/facilities shall be well covered and made safe.
 - vi. There is efficient use of water in the technology and wherever possible the use of freshwater is kept to a minimum.

PART THREE

Monitoring, reporting and regulating

12. Monitoring, reporting and regulating

The NDP states that water should be managed, monitored and protected with oversight/supervision remaining a national responsibility (NPC, 2011). This implies that the same is applicable to the provision of sanitation services. The Department of Water and Sanitation, as the regulator of Water Services (that includes sanitation services) in South Africa, is obliged to monitor Water Services Institutions as specified in Section 62 of the Water Services Act (No. 108 of 1997):

(1) The Minister and any relevant Province must monitor the performance of every water services institution in order to ensure-

- (a) compliance with all applicable national standards prescribed under this Act;*
- (b) compliance with all norms and standards for tariffs prescribed under this Act; and*
- (c) compliance with every applicable development plan, policy statement or business plan adopted in terms of this Act.*

(2) Every water services institution must-

- (a) furnish such information as may be required by the Minister after consultation with the Minister for Provincial Affairs and Constitutional Development; and*
- (b) allow the Minister access to its books, records and physical assets to the extent necessary for the Minister to carry out the monitoring functions contemplated in subsection (1).*

Water Services Institutions are therefore bound to provide the necessary information required to conduct analyses on the quality of water services and performance. It is illegal for Water Services Authorities and Water Services Providers to refuse, withhold, or provide, false information (Section 82 of the Water Services Act No 108 of 1997). Participation in Blue Drop, Green Drop and No Drop assessments, and future assessments to be developed, is therefore mandatory.

Over the last decade the DWS has been measuring and monitoring the overall performance of water services authorities through the Regulatory Performance Measurement System (RPMS), and drinking water quality and wastewater management through the Blue/Green Drop Certification Programmes. The NWRS2 emphasises that the governance of monitoring and information management in the water sector (including sanitation) should be improved and that the continuation of existing monitoring programmes should be uninterrupted (DWA, 2013b).

Goal: Water and sanitation services are monitored and reported on for the purposes of regulation and good governance.

- 1) A monitoring and reporting system shall be in put place to ensure the monitoring of the application of the norms and standards and the reporting of best practices and lessons learnt for adaptation and future sustainability.
- 2) Audited and verified values pertaining to sanitation services shall be published for each services provider to allow the public to view the performance and rating of a services provider in terms of providing sanitation services.
- 3) The RPMS is a tool for consistently, transparently, and objectively measuring performance in the water sector and needs reliable data from WSAs for effective measurement of performance. Performance may be enhanced by incentive-based or enforcement-based regulation:
 - (a) Incentive-based regulation is based on benchmarking and is designed to stimulate/ entice people responsible for water services to enhance performance levels to the benefit of all people and the environment. The conscious use of rewards, as well as penalties, to encourage performance excellence, based upon an innovative performance rating system, creates a platform for an inclusive regulation model that promotes an enabling environment for a shift from minimum requirement compliance towards continued risk management. The Blue Drop, Green Drop and No Drop assessments are examples of incentive-based regulation.

- (b) Enforcement-based regulation is applied to water services institutions not complying with the Water Services Act, 1997. The Enforcement Protocol contains a generic response process in dealing with non-compliance and also enables fast-tracking of strong enforcement measures where public health is at risk. The Enforcement Protocol presents a systematic process for responding to issues, and shall be used by both water services and water resources authorities, to ensure a uniform approach.
- 4) The governance of monitoring and information management shall be improved upon by adhering to regulation principles, which refer to the regulation of both public and private investment in infrastructure and service provision. Where regulators comply with these principles, regulation is likely to be effective, appropriate and accepted by all stakeholders. These principles are the following:
- **Coherence:** Regulations should be complementary, mutually supportive and consistent over time. Regulatory coherence requires that national regulators, ministries, and provincial and municipal regulators have clearly defined responsibilities, to ensure that the same agency always makes decisions involving specific aspects of regulation. This gives continuity in terms of the people and methods involved in decisions, which makes compliance with laws and regulations more likely.
 - **Communication:** Regulators are required to publish and explain the goals and policies that guide decisions on entry, pricing and other industry matters subject to supervision. This forces government to consider its long term policy goals and regulatory principles, and enables consumers and agencies to predict how they will be treated in future.
 - **Independence:** For effective regulation, agencies must be objective and a-political enforcers. If regulators are not insulated from political interference, there is the danger that regulatory processes become politicised, decisions are discredited and challenged, and policies lack continuity.
 - **Accountability:** Regulator independence should be balanced by accountability. Checks and balances are required to ensure that regulators do not become capricious, corrupt, or inefficient. Consumers and affected parties should know who makes regulatory decisions and what guides them, and to voice their concerns to facilitate easy and quick redress if a regulator acts arbitrarily or incompetently.
 - **Transparency:** All regulatory rules and agreements, and the principles that guide them should be on public record and accessible to all, not just service providers. Transparency encourages investment by current and new investors, helps to avoid costly, time-consuming regulatory disputes, and protects against corrupt regulation.
 - **Predictability:** Regulators must be predictable and follow the rule of law, and respect precedents and the principle in conforming with past decisions in similar circumstances, unless there is good reason not to do so. Regulatory decisions must be based on durable principles, or consumers lose confidence in regulation, which undermines investment in infrastructure.
 - **Capacity:** A regulator's responsibilities should match its financial and human resource capacity. Financing reflects government commitment to supporting independent regulatory institutions.
- 5) Communities have a role to play as well. It shall be the responsibility of the community members to inform their services provider of faulty systems, supply problems and abuses or misuse of the services. Members of the community shall monitor responsible use and prevent misuse, e.g. illegal connections, and help to distribute information to their neighbours.

PART FOUR

Conclusion

Conclusion

14. Conclusion

The following actions need to be taken at national and local levels to ensure the sustainable provision of levels of water services:

- Align policy positions and implementation strategies across stakeholder departments focusing on long term sustainable service delivery.
- Create and apply common definitions across stakeholder departments.
- Align and clarify municipal services definitions.
- Develop and regulate transparent financing strategies and accountability plans, including alignment of grants and subsidies, as well as setting appropriate water tariffs.
- Develop guidelines for good governance of water services.
- Develop guidelines for participatory planning and implementation.
- Provide a list of appropriate technologies for service levels, flexibility is allowed
- Formalise and regulate monitoring and reporting processes.
- Ensure training and capacity building of officials, local government, implementing agents, and the public.

The above can be tackled through a phased approach, not necessarily sequential. An example is as follows:



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Annexure A

Annexure A: Legislative requirements for water and sanitation services in South Africa

A number of South African policies, legislation and regulations have direct implications for the provision of water and sanitation services to all people in South Africa, or govern and inform the provision of water and sanitation services. Note that this is not an exhaustive list; the services authority/provider is obligated to ensure that it stays informed and abreast of current and new legislation, policies, strategies and regulations in the water and sanitation sectors.

SOUTH AFRICAN ACTS RELATED TO WATER AND SANITATION

The Constitution of South Africa The Constitution of South Africa says that *"everyone has the right to have access to ... sufficient ... water"* (Section 27(1)(b)) (South Africa, 1996). The Water Services Act, the principal policy regulating water service provision in South Africa, legitimises the right to basic water and sanitation by articulating that (Section 3) (South Africa, 1997a):

- 1) Everyone has a right of access to basic water supply and basic sanitation.
- 2) Every water services institution must take reasonable measures to realise these rights.
- 3) Every water services authority must, in its water services development plan, provide for measures to realise these rights.
- 4) The rights mentioned in this section are subject to the limitations contained in this Act.

The Constitution separates the powers of the different spheres of government (national, provincial, local), which all should cooperate, but not duplicate, their respective functions. The Constitution allocates the management of water resources to national government, and the management of water and sanitation services for all citizens to municipalities (local government), thus an Act that deals with the sources of water (national responsibility) and an Act that deals with water services (local responsibility).

The National Development Plan (NDP)

The National Development Plan for South Africa says that *"by 2030.... "ensure that all people have access to clean, potable water and that there is enough water for agriculture and industry, recognising the trade-offs in the use of water"*. This includes water for sanitation in the requirement set by the NDP of *"Reduce water demand in urban areas to 15 percent below the business-as-usual scenario by 2030"* (NPC, 2011).

The National Development Plan makes a firm commitment to achieving a 'decent standard of living through the elimination of poverty and reduction of inequality'. The core elements of a decent standard of living identified in the NDP are housing, water, electricity and *sanitation*; safe and reliable public transport; quality education and skills development; safety and security; quality health care; social protection; employment; recreation and leisure; *clean environment*; and adequate nutrition.

Chapter 4 of the NDP (NPC, 2011) states that: *"before 2030, all South Africans will have access to sufficient safe water and hygienic sanitation to live healthy and dignified lives. Standards for services provision will vary across the country... while local government will retain responsibility for ensuring adequate service provision in its areas, regional utilities will provide services where municipalities have inadequate technical and financial capabilities"*.

National Water Act (NWA)

The purpose of the National Water Act (No 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled

in ways that take into account, amongst other factors, meeting the basic human needs of present and future generations; promoting equitable access to water; redressing the results of past racial and gender discrimination; promoting the efficient, sustainable and beneficial use of water in the public interest; facilitating social and economic development; providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity; reducing and preventing pollution and degradation of water resources; meeting international obligations; promoting dam safety; managing floods and droughts, and to establish suitable institutions and to ensure that these institutions have appropriate community, racial and gender representation. This Act regulates the use, flow and control of all water in the country in ensuring that water is allocated equitably, used beneficially in the interest of the public while promoting environmental values. The Act gives the Department of Water and Sanitation the tools to gather the information that is needed for the optimal management of water resources. Water resource management includes requirements and regulation for waste water use. The NWA prescribes that discharge of waste or water containing waste in terms of section 21 of the National Water Act (South Africa, 1998b).

National Water Services Act (NWSA)

The National Water Services Act (No 108 of 1997) governs the provision of services to consumers. Section 3 of the Act states that “everyone has a right of access to basic water supply and sanitation”. Basic water supply is defined as, Basic sanitation is defined as: *“the prescribed minimum standard of services necessary for the safe, hygienic and adequate collection, removal, disposal or purification of human excreta, domestic waste water and sewage from households, including informal households”*. Section 3 also states that services authorities must take reasonable measures to realise this right in their water services development plans, with a preference to basic water supply and basic sanitation facilities.

Regulation 2 of the Compulsory National Standards states that the minimum standard for basic sanitation services is –

- (a) *the provision of appropriate education; and*
- (b) *a toilet which is safe, reliable, environmentally sound, easy to keep clean, provides privacy and protection against the weather, well ventilated, keeps smells to a minimum and prevents the entry and exit of flies and other disease-carrying pests.*

The National Environmental Management Act

The National Environmental Management Act (No 107 of 1998) (NEMA) requires the consideration of all relevant factors, including (amongst others) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and environmental justice must be pursued (South Africa, 1998c).

The Department of Environmental Affairs and Tourism published a National Framework for Sustainable Development for public comment (DEAT, 2009). This Framework sets ‘substantive principles’ for the conditions that must be met in order to have a sustainable society, which are based on principles already enshrined in legislation and policies. These principles emphasise a cyclical and systems approach to achieving sustainable development through efficient and sustainable use of natural resources; socio-economic systems embedded within, and dependent upon, ecosystems; and meeting basic human needs to ensure resources necessary for long-term survival are not destroyed for short term gain.

The Housing Act (1997)

The Housing Act (No. 107 of 1997) identifies that all citizens and permanent residents of South Africa will, on a progressive basis, have access to potable water, adequate sanitary facilities and domestic energy supply (South Africa, 1997b). The Act defines sanitation services as a legislative requirement in the provision of housing after a ground-breaking Constitutional Court decision on the Grootboom case. The court ruled that *the right delineated in section 26(1) is a right of “access to adequate housing” as distinct from the right to adequate housing encapsulated in the Covenant. It recognises that housing entails more than bricks and mortar. It requires available land, appropriate services such as the provision of water and the removal of sewage and the financing of*

all of these, including the building of the house itself. For a person to have access to adequate housing all of these conditions need to be met: there must be land, there must be services, and there must be a dwelling" (Constitutional Court of South Africa, 2000). Sanitation is thus included as part of this Constitutional right to adequate housing.

The Department of Human Settlements requires that the nature and level of permanent engineering infrastructure should be the subject of engagement between the local authority and residents. Community needs must be balanced with community preferences, affordability indicators and sound engineering practice. The National Norms and Standards in respect of Permanent Residential Structures contained in the National Housing Code should be adhered to in as far as municipal engineering services are concerned.

The New Housing Policy and Strategy White Paper has the underlying principle that communities should pay for the operational and maintenance costs of the service provided; the services are not to be provided free. The White Paper outlines that external bulk and connector services to residential areas are the responsibility of local government, while internal infrastructure must be provided by developers (Department of Housing, 1994). The White Paper is not prescriptive as to the type of sanitation facility/service to be provided through the housing subsidy, but outlines an approach for the provision of water, sanitation, roads, stormwater drainage and domestic energy to housing developments.

The Department of Health

The Department of Health's set of primary health norms and standards (Department of Health, 2000) states that adequate basic provision of sanitation is one well-constructed VIP toilet to agreed standards per household and that the bucket system should be phased out. The standards also indicates that the responsibility for sanitation services lies with the local authority or, if not, the local water committee is the vehicle for sanitation development.

The norms and standards advocate the linkage between the health sector and other development sectors, such as the DWS, to build capacity in hygiene education and training of community health committees. These standards indicate that the Environmental Health Officers (EHOs) should work with other sectors in development projects; work with local clinic staff for teamwork in motivating community committees to improve water and sanitation; work with health staff of clinics, NGOs and local government structures to provide hygiene education and training and build capacity of communities; empower committees through training, technical advice and continuing support and monitoring to undertake and manage their own development, including water and sanitation; provide information to schools on undertaking water and sanitation and personal and public health; monitor that sanitation and water systems do not create environmental problems; and assist communities develop the capacity to use the cycle of participation (assessment, analysis, and action) and provide particular assistance in preliminary assistance through environmental surveys.

The Department of Education

The Department of Education has two approaches to the delivery of services to schools (DWAF, 2007), namely the provision of water supply and sanitation facilities to new schools; and the refurbishment of existing water supply and sanitation facilities.

The Minister of Education, Angie Motshekga, has in 2013 published the legally binding minimum norms and standards for schools infrastructure (Department of Education, 2013). These norms and standards state that "all schools must have a sufficient number of sanitation facilities that are easily accessible to all learners and educators, provide privacy and security, promote health and hygiene standards, comply with all relevant laws and are maintained in good working order. The standards also specify that the choice of a sanitation technology be based on an assessment conducted on the most suitable sanitation technology for a particular school.

The national policy with which sanitation services at schools should comply with is the Strategic Framework for Water Services. The Framework indicates that the national Department of Education (together with the provincial departments) is *responsible for ensuring that all schools are provided with adequate water and sanitation facilities and*

that these are operated sustainably and are adequately maintained (DWAf, 2003).

The Occupational Health and Safety Act (No 85 of 1993)

A waste water treatment plant is a “production” process and it is required to comply with the Occupational Health and Safety Act (OHSA). According to this act, a sanitation infrastructure or a waste water treatment plant shall be so designed that all the requirements of the OHSA, and its regulations, are adhered to (South Africa, 1993).

The Minister of Manpower has, under section 35 of the Machinery and Occupational Safety Act, 1983 (Act 6 of 1983) made regulations for sanitation at the workplace. According to the Department of Labour (2004), every employer shall provide sanitary facilities at the workplace in accordance with the provisions of Parts F, P and Q of the National Building Regulations. An employer may, where less than 11 persons are employed on one premises, make written arrangements for such persons to use toilets and washbasins on adjoining premises, provided that such facilities are freely and readily accessible; and the facilities comply with the provisions of these Regulations as well as with SABS 0400 with respect to the total number of employees who will be using the facilities; and the condition of such facilities.

Every employer shall make toilet paper available to employees; provide every toilet with a toilet seat; supply a towel to every employee for his sole use or disposable paper towels or clean portions of continuous cloth towels, at the washbasins; and provide soap or a similar cleansing agent to employees. Every employer shall maintain all rooms and facilities in a clean, hygienic, safe, whole and leak-free condition, and in a good state of repair.

National Water and Sanitation Act Amendment Bill

This Act attempts to align the National Water Act of 1998 to provide an integrated water licensing system between stakeholder departments in the water and sanitation sectors.

Municipal Systems Act (No 32 of 2000)

The Local Government: Municipal Systems Act 32 of 2000 (Municipal Systems Act) provides the mechanism and procedures to enable municipalities to uplift their communities socially and economically, and guarantee affordable universal access to basic services. Section 4(2)(d) of the Municipal Systems Act states that the council of a municipality, within the municipality’s financial and administrative capacity, has the duty to ensure that municipal services are provided to the local community in a financially and environmentally sustainable manner through consulting the local community about the level, quality range and impact of municipal services provided by the municipality, either directly or through another service provider; and the available options for service delivery. Section 4(2)(f) states that the municipality has a duty to provide communities equitable access to the municipal services to which they are entitled. Chapter 4 focuses on community participation, outlining the mechanisms, processes and procedures to be followed by the municipality in order to create conditions for the local community to participate in the affairs of the municipality. Sections 25 and 26 state that all municipalities are required to compile an IDP, which is described in section 25(1) as a single, inclusive and strategic plan for the development of the municipality. Chapter 8 focuses on municipal services and emphasises in section 73 that basic sanitation forms part of the right to basic municipal services. Section 73(1) states that a municipality must give effect to the provisions of the Constitution and (a) give priority to the basic needs of the local community; (b) promote the development of the local community; and (c) ensure that all members of the local community have access to at least the minimum level of basic municipal services.

SOUTH AFRICAN WATER AND SANITATION POLICIES AND STRATEGIES

National Sanitation

The Department of Water and Sanitation gazetted the latest National Sanitation Policy in 2016 for public comment, which states that sanitation is: “*the collection,*

Policy (2016) *removal, treatment and or disposal of human excreta, and domestic public institution wastewater, and the collection, treatment and/or disposal of municipal, agricultural, mining and industrial wastewater. This includes all the organisational arrangements necessary to ensure the provision of sanitation services including, amongst others, consideration of natural resources, social acceptance, appropriate health, hygiene and sanitation-related awareness and technologies, the measurement of the quantity and quality of discharges where appropriate, apply the polluter pays principle, the associated billing, collection of revenue and consumer care. Water services authorities have a right but not an obligation to accept industrial, agricultural and mining wastewater within their area of jurisdiction” (DWS, 2016).*

Free Basic Services Policy (2002) Basic services such as electricity and energy, water and sanitation, refuse, and waste removal are critical services to improve the lives of people. In South Africa government has committed to providing a basic amount of free water and electricity to poor people. Sanitation and waste removal will also be provided where it is possible (dplg, 2005a).

The ultimate objective of the Free Basic Services (FBS) Policy is that the indigents in the country will all have access to basic services, which includes water supply (at least 6 000 litres per household of 8 persons per day) and sanitation (at least a VIP toilet per household of 8 people).

Free Basic Sanitation Policy (2002) The intent of the Free Basic Sanitation Policy is to make provision through subsidies via the Municipal Infrastructure Grant (MIG) and the Local Government Equitable Share (LGES) grant for access to at least a basic sanitation services for those who cannot afford it – the registered indigent.

In March 2009 the Free Basic Sanitation (FBSan) Implementation Strategy was approved by the Minister of Water Affairs. The Strategy was developed to guide WSAs in *providing all citizens with free basic sanitation by 2014* and to implement their own FBSan policies in line with national policy (DWAF, 2009).

The Strategic Framework for Water Services (2003) The Strategic Framework for Water Services (SFWS) is a comprehensive policy document for water services that, inter alia, sets goals for access to services, education and health, free basic services and institutional development and performance. It defines the responsibilities of Water Services Authorities (WSAs) and Water Services Providers (WSPs), and indicates that WSAs must provide infrastructure, promote health and hygiene, and be responsible for the cost of operation and maintenance of basic services.

The SFWS was adopted by Cabinet in 2003 and spells out a vision: *“National norms and standards are developed and implemented to protect the social and economic interests of all consumers, especially poor and vulnerable households, and to protect the environment.”* The Framework also states that *“emphasis will be placed on gender-sensitive health and hygiene education so that the provision of water and sanitation services will be accompanied by improvements in health and significant reductions in water-related diseases such as cholera and diarrhoea. This is particularly important in the context of vulnerabilities arising from HIV/AIDS”* (DWAF, 2003).

The principles of sustainability, affordability, effectiveness, efficiency and appropriateness should be kept uppermost in providing sanitation services. The key principles informing this vision are the following (DWAF, 2003):

- Universal service obligation. Norms and standards protect the constitutional right of consumers to receive at least a basic minimum standard of service which is safe and reliable and which promotes a healthy living environment.
- Diversity. National norms and standards take into account the diverse contexts within South Africa.
- Technology. National norms and standards are not prescriptive in the specific choice of technology to be used to achieve a specified or desired outcome.

- Assessment. The costs and benefits of new regulatory initiatives and revised norms and standards are assessed prior to adoption and implementation wherever practical.
- Affordability. The necessary resources are available to meet the defined national norms and standards.

Free Basic Sanitation Implementation Strategy (2009)

The Free Basic Sanitation (FBSan) Implementation Strategy, which was developed to guide WSAs in “providing all citizens with free basic sanitation by 2014” and to implement their own FBSan policies in line with national policy. The strategy acknowledges the “right of access to a basic level of sanitation service” enshrined in the Constitution, and that municipalities have an obligation to ensure that poor households are not denied access to basic services due to their inability to pay for such services. The strategy adopts the principles that “national guidelines should be implemented with local choice” and that there should be local flexibility in implementation of the strategy.

The National Sanitation Strategy (2005)

The National Sanitation Strategy (DWAF, 2005a) was compiled to provide a coherent approach to sanitation delivery in South Africa. The strategy states that: *“informal settlements must not be treated as emergency situations for the purpose of this strategy but should be provided with viable and sustainable solutions. Solutions such as communal facilities and chemical toilets should not be used where the system is expected to have a duration of more than one month.”*

This is particularly relevant in light of the recent South African Human Rights Commission (SAHRC) ruling that chemical toilets are not to be provided as a long term solution (Grootboom case).

The Second National Water Resources Strategy (2013)

The NWRS2 provides a framework for the protection, use, development, conservation, management and control of water resources in South Africa. Core Strategy 6, in the NWRS2 (DWA, 2013b) spells out that “... implementing water use efficiency, conservation and water demand management is a non-negotiable principle”. It adopted a position of developmental water management, a framework which directly addresses the linkages between water management and the developmental and transformational goals of government. This approach also requires the consideration of the entire water value chain in terms of how water can contribute to achieving equitable, beneficial and sustainable development across the country.

This strategy highlights the need to reduce water losses and increase water use efficiency; promote water saving through incentive-based programmes, including smart technology and rebates for water savings; fast-track the implementation of water conservation and water demand management (WC/WDM) in consideration of the elevated status in the National Government’s Plan of Action (Outcome 10), which has set a target of 15% in 2014 for the reduction of water losses in distribution systems.

The water resource protection theme of the NWRS2 emphasises the need to protect fresh water ecosystems, which are under threat because of pollution from, amongst others, sanitation systems. The NWRS2 states that conventional waterborne sanitation, which uses potable standard water to wash away human faeces, in the process combining good quality water with potentially valuable resources (faeces and urine) to create polluted water that needs to be treated, is not an efficient system in a context where fresh water is scarce and precious and where fertiliser inputs for agriculture productivity are limiting (DWA, 2013b). One of the main sources of pollution that have a negative impact on water quality is wash-off from areas of human settlement with inadequate sanitation. Groundwater pollution, such as acid mine drainage (AMD) and poor sanitation, must be addressed effectively.

Re-use of water is becoming more acceptable and feasible because of increasing water shortages, improved purification technology and decreasing treatment costs. However, the direct re-use of treated wastewater can pose a risk to public health

and safety; must be managed carefully and be subject to water quality management and control. Advanced treatment technologies, sufficient operating capacity and proper monitoring of all processes and quality of potable water produced is essential. The NWRS2 emphasises that performance of municipal wastewater and effluent treatment plants nationwide will have to be improved to meet high standards, to result in consistently good quality discharges to the environment before direct water re-use can be placed on the national water supply agenda (DWA, 2013b).

Water quality standards

The term *water quality* describes the physical, chemical, microbiological and aesthetic properties of water that determine its fitness for a variety of uses and for protecting the health and integrity of aquatic ecosystems. For water to be potable, *primary standards* regulate substances that potentially affect human health, and *secondary standards* prescribe aesthetic qualities, those that affect taste, odour, or appearance.

Potable water is thus water that is clear, tastes and smells good, and is free of contaminants and pollutants that could affect human health.

Key references relating to the provision of safe drinking water quality in South Africa can be downloaded from www.dwaf.gov.za and include, amongst others, the following:

- Water Services Act (108 of 1997)
- National Water Act (36 of 1998)
- Municipal Structures Act (117 of 1998)
- Compulsory National Standards for the Quality of Potable Water (2001)
- Strategic Framework for Water Services (2003)
- National Health Act (61 of 2003)
- National Water Resources Strategy (2004)
- Framework for Drinking Water Quality in South Africa (2005).

Annexure B

Annexure B: Principles underpinning the norms and standards for water and sanitation services

The norms and standards for levels of water and sanitation services were developed based on the guidelines of the Second National Water Resource Strategy (NWRS2), which provided a framework for the protection, use, development, conservation, management and control of water resources in South Africa. The National Water Resources Strategy has adopted a position of developmental watermanagement, a framework which directly addresses the linkages between water management and the developmental and transformational goals of government. This approach also requires the consideration of the entire water cycle and sanitation value chain in terms of how water can contribute to achieving equitable, beneficial and sustainable development across the country. Developmental watermanagement is also focused on those priority actions within the delivery capacity of the state and other role players that will have the greatest developmental impact (DWA, 2013).

The focus of the NWRS2 is to not increase water supply from the source but rather to reduce demand, or supplement demand with water re-use. In addition, equity in the utilisation of the resource is key. The NDP (NPC, 2011) proposed a dedicated national programme to reduce water demand and improve water use efficiency.

The key overarching principle for the norms and standards regarding levels of water services is sustainability. Sustainability of a service is achieved when consumers want and accept the level of service provided, are able to pay for it, and the skills are available locally to operate, repair, maintain and upgrade the system. Managing a water scheme locally not only reduces the cost of running it, but also ensures that money is retained in the local area, thus boosting the local economy. Sustainable water services thus require that systems are set up to ensure that the most appropriate infrastructure is provided and is properly managed; timely repairs are made in case of breakdowns; infrastructure can be renewed and replaced at the end of its useful life; and there is capacity to extend delivery systems and improve services delivery in response to changes in demand (Duncker & Wilkinson, 2014). The use of technology that is appropriate to a particular situation or environment in which water services are provided is of utmost significance in the sustainability of that particular service. An inappropriate choice of technology for a particular situation not only results in a large capital outlay, but it is often unsustainable.

A water service is sustainable when:

- it provides the services for which it was planned;
- it functions properly and continuously, and is used over a prolonged period of time, according to the designed life-cycle of the infrastructure and equipment;
- the management of the water service involves the consumers, is sensitive to gender issues, establishes partnerships with local authorities, and involves the private sector as required;
- its operation, maintenance, rehabilitation, replacement and administrative costs are covered at local level through user tariffs, or through alternative sustainable financial mechanisms (grants, etc);
- it can be operated and maintained at the local level with limited, but feasible, external support (e.g. technical assistance, training and monitoring); and
- it has no harmful effects on the environment.

Providing sustainable water service delivery needs a combination of management, financial, engineering, economic and social practices and techniques within a strong implementation framework and a resilient management plan. To ensure inclusion of all sustainability aspects into water services

will require provision of a service in balancing the five aspects for sustainability, i.e. economic efficiency; social equity; environmental security; and appropriate technology, which are underpinned by institutional support (see Figure 1).

In providing a sustainable water service, not one of the sustainability circles should be favoured at the expense of the other.

Therefore, the principle of sustainability means that appropriate technology, economic efficiency, social equity and ecological security is supported by the institutional environment and arrangements in the water sector.

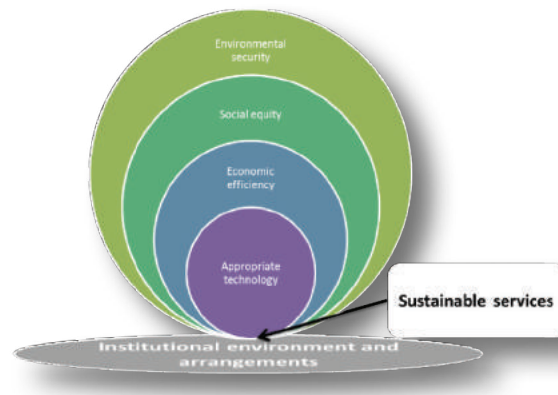


Figure 1: Sustainability aspects

(Adapted from: Duncker & Wilkinson, 2014).

The norms and standards in particular draw on the principles of universal access, human dignity, user participation, service standards, redress and value for money. The key principles are the following (DWAf, 2003):

- **Universal service obligation.** Norms and standards protect the constitutional right of consumers to receive at least a basic minimum standard of service which is safe and reliable and which promotes a healthy living environment.
- **Diversity.** National norms and standards take into account the diverse contexts within South Africa.
- **Technology.** National norms and standards are not prescriptive in the specific choice of technology to be used to achieve a specified or desired outcome.
- **Assessment.** The costs and benefits of new regulatory initiatives and revised norms and standards are assessed prior to adoption and implementation wherever practical.
- **Affordability.** The necessary resources are available to meet the defined national norms and standards.

Cognisance is taken of the water scarcity context of the country, and as such reduction, re-use and recycling are common themes that underpin the norms and standards. The effectiveness of the services towards the protection of public health and the greater economic development agenda of the country also receives firm attention.

The norms and standards for water and sanitation services are based on the National Water Act and the revised National Sanitation Policy (DWS, 2016) and all the other legislation that it derives from including, but not limited to, the lessons that the sector has learned to date. The National Sanitation Policy (DWS, 2016) is principle-based rather than technology-based, and states that the minimum acceptable basic level of sanitation services encompasses:

- appropriate health and hygiene awareness and behaviour,
- a system for disposing of human excreta, household wastewater and refuse, which is acceptable and affordable to the users, safe, hygienic and easily accessible and that does not have an unacceptable impact on the environment, and
- a toilet facility for each household.

The SFWS (DWA, 2003) recommends that services authorities/providers must typically address the following situations regarding water and sanitation services:

- In urban areas, where many businesses are located and where residential densities are high, waterborne sanitation is generally the most appropriate technical solution and should be regarded as a basic level of service for the purposes of the free basic sanitation policy.
- In rural areas, where housing densities are low and few businesses are located, on-site technical solutions are an appropriate basic level of service.
- In intermediate areas (for example, peri-urban areas or rural areas where settlement densities are high), a water services authority must decide on an appropriate technology which is financially viable and sustainable. In most instances, on-site sanitation systems are likely to be the most appropriate solution. Care must be exercised when choosing waterborne sanitation systems in this context. The water services authority must ensure that the water services provider will be able to maintain and operate this system sustainably over time with the available funds.

Water and sanitation services are equitable

The NWA identifies “*sustainability and equity*” as “*central-guiding principles in the protection, use, development, conservation, management and control of water resources. These guiding principles recognise the basic human needs of present and future generations, the need to protect water resources, the need to share some water resources with other countries, the need to promote social and economic development through the use of water and the need to establish suitable institutions in order to achieve the purpose of the Act*” (South Africa, 1998b).

According to the National Policy Review (DWA, 2013), equity in the water sector has several critical elements, i.e.:

- The provision of an adequate supply of safe water to all households to meet their domestic and productive requirements, with a minimum of 25 litres per person per day provided free of charge to all indigent households.
- Ensuring that the authorisation to use water for productive purposes (i.e. access to water as a means of production) is transformed to align with the demographic realities of South Africa and serves to support black economic empowerment, including both black women and men, and the development of an inclusive economy.
- That the allocation and use of water supports the reduction of poverty and inequality across the country and that the water needs of poor rural communities are met and protected to support the development of sustainable livelihoods.
- That the indirect benefits of water from healthy river systems are protected and maintained.

Constraints to water and sanitation access and control are often rooted in both institutional and social structures, as well as in political and legal issues about land water ownership and tenure arrangements. Social inclusion in water and equitable allocation of funding for water require governments and policy makers to reform discriminatory institutional policies and practices through broader structural changes. Reforms must take into account any informal rights that men and women have secured. (Van der Blik, *et.al*, 2014).

Providing everyone with access to water - whether male, female, wealthy or poor - is vital to improving health, livelihoods and economic growth. This is especially important in rural and urban fringe areas. Once people have water access, they must be able to manage the benefits for both domestic and productive use. Women not only need access to water for reliable and safe domestic use (drinking, childcare, cooking, cleaning and washing), they also need access to water for agriculture, home construction and income-generating activities (bread-baking, hair dressing, etc).

The National Water Policy Review (NWPR) is very much focussed on equity and motivates for different practice in the management of water in the country in response to different social (equity) needs. This principle of prioritising equity in reallocation of ‘set-aside’ water (water that has been returned to the public trust) supports the fundamental water principles and constitutional imperatives

of equity and equitable access in the country (DWA, 2013). This is backing the Strategy for Water Allocation Reforms (WARS); appropriate means of resource allocation that achieve redress in water allocation while ensuring optimal use of the resource must be found (DWAF, 2008a).

From an agricultural point of view, the 'invisibility' of rural water uses, such as fish production, livestock watering, homestead vegetable gardens, domestic use, and rural enterprises can lead to serious livelihood consequences for women and other marginal groups when water is transferred to address the needs of other sectors. To achieve equity in access to water services requires that all South Africans have access to at least a minimum level of water service. To achieve equity in access does not imply that local authorities decide which services will be provided to a household, but rather that access is determined jointly, with active participation of consumers (Duncker & Wilkinson, 2014). Sustainable water services must be demand driven, based on balancing the interdependent circles of sustainable services (see Figure 1).

The SFWS (DWAF, 2003) states that *emphasis will be placed on gender-sensitive health and hygiene education so that the provision of water and sanitation services will be accompanied by improvements in health and significant reductions in water-related diseases such as cholera and diarrhoea. This is particularly important in the context of vulnerabilities arising from HIV/AIDS* (DWAF, 2003). The communication of/training in effective water use, hygiene and related practices play a significant role in stimulating demand for a service, ensuring participation in the process and supporting the long-term acceptance and sustainability of a service provided to the household. Sustainable water services provision must ensure that robust, on-going water conservation awareness and promotion interventions are part of the services provided.

In line with the Constitution and NDP, the revised sanitation policy recognises the need to afford unique attention to the vulnerable and unserved, thus prioritising those most in need. Further, equity calls for attention to be paid to the special needs of all different groups in society such as women and girls, the disabled, HIV and AIDS infected and affected. Equitable sanitation services can only be realised effectively through full, free and meaningful participation in decision-making processes by people affected by the decisions. Participation will ensure quality planning and implementation that will enhance the effectiveness and sustainability of services.

Water conservation and demand management is a key aspect of the NWRS 2 and the NDP. In line with the imperative for water services to be equitable, there is a need to ensure that water and sanitation services are acceptable. There is evidence from practice that the re-use of greywater or reclamation for drinking water purposes has met with resistance from users, therefore active advocacy and information sharing campaigns must be implemented to raise the awareness and increase the knowledge of consumers regarding water conservation, effective water use, and greywater re-use.

Water and sanitation services are acceptable, safe and hygienic

Water and sanitation services will be planned and delivered to ensure that their design, positioning and conditions of use as well as management are sensitive to people's cultures and priorities. Further services will promote the health and well-being of communities through, but not limited to, actively addressing the prevention and control of disease, injury, any form of harm, and facilitating the practice of hygienic behaviours. In particular, the services will ensure the safe containment of human excreta through the value chain as well as related vector control. In addition, the safety of vulnerable groups such as the young, the elderly and otherwise incapacitated will be given due consideration as will the menstrual hygiene needs of all women and girls.

Water and sanitation services are economic and affordable

The economic situation of water provision is fluid: goals are changing, service levels are fluctuating, technology is evolving, and consumer demand is growing.

Water services are financed through the water and sanitation components in the local government equitable share (LES), while capital spending on water assets is mainly financed through the basic services component of the municipal infrastructure grant (MIG). Metros contribute substantially of their

own revenues towards supplying water services to complement the local government equitable share, while municipalities generally do not do so (possibly because metros serve a larger variety of customers, including businesses and industries, compared to smaller municipalities that largely serve a residential customer base).

The Department of National Treasury has observed that underperformance of actual revenue collections against billed revenue may result in, amongst others, the reduced affordability of municipalities to provide the services and the reduced ability of households to pay for services. Users typically want water that is accessible and of sufficient quantity, but have much less demand for safe water. Some users may in fact want more than what is on offer - more water, closer to the homestead - but they are not offered the choice of a higher level of service. The poor is over-represented among the unserved because they cannot afford the tariffs charged for public water services and are most in need of public support. In many cases, consumers end up with services that are either above or below what they asked for or can afford, with the resulting limited payment for services, most of the time covering basic operation and maintenance costs, but rarely rehabilitation or replacement costs (Burr & Fonseca, 2013).

High service levels may go beyond the ability of users to pay, the capacity of the provider to operate the system or the capacity of the service authority to regulate or support. To increase the chances of sustainability, the intended level of service must match the demand of users for that level of service and the ability and willingness to pay for it, as well as the management capacity of service providers and support agents.

Therefore, the principle of economic and affordable means that the service provider must be able to afford the provision of the service and consumers must be able and willing to pay for the service. Service providers will thus ensure that an affordable level of service is provided, and consumers receive value for money. In turn, consumers will note the responsibility to pay for the service. The access of indigent users will be financed through the relevant subsidy mechanisms.

Water and sanitation services are effective and efficient

Water services occur within a context, therefore water service authorities and providers, at national, local and community levels, need to be aware of the relevant policies and consider the physical, social, economic, financial, institutional and environmental frameworks in which water services are provided.

'Effective' means the degree to which objectives are achieved and the extent to which targeted problems are solved. Effectiveness is determined without reference to cost – it means "doing the right thing", achieving the intended purposes, i.e. policy imperatives such as universal access to a basic level of water; and social, economic and environmental imperatives of addressing the negative effects of inadequate water demand management.

'Efficient' means the accomplishment of, or ability to accomplish, a job with a minimum expenditure of time and effort; i.e. the ability to perform or function in the best possible manner with the least waste of time and effort by having and using the requisite knowledge and skills. Efficiency is determined in relation to cost – it means "doing the thing right", thus providing water in the most cost effective manner so that the benefits of the provision of water outweigh the social, economic and environmental costs of providing water.

It is generally accepted that the primary purpose of water and sanitation services is to protect and promote human health by providing a clean environment in which human and other solid waste is safely contained to reduce disease incidence and transmission. Effective and efficient sanitation services will therefore seek to achieve this primary goal while maximising the value from resources deployed (cost, time, space, people, environment, and infrastructure). In addition, the services will ensure that in meeting the primary objective, and cognisant of context, due diligence is exercised towards realising the other socio-economic benefits from sanitation such as protecting human dignity and safety particularly that of women and girls, promoting the participation of girls in schools, potential

reuse options such as energy production, water reclamation, nutrient recovery, nutrition and food security.

Sanitation services occur within a context, therefore water service authorities and providers, at national, local and community levels, need to be aware of the relevant policies, and consider the physical, social, economic, financial, institutional and environmental frameworks in which sanitation services are provided.

It is imperative that the capacity of consumers to use water effectively is ensured in pursuit of the development objectives of the country. This is linked to ongoing monitoring and compliance monitoring of equity and beneficial use of water (DWA, 2013). Therefore, the principle of effectiveness and efficiency means that water services are achieving their intended purposes (providing potable water) within their social, economic and environmental contexts in a cost effective manner.

Water and sanitation services are reliable

The objective of any water service is to make water available to the consumer in proper quantity and pressure, with acceptable quality in terms of flavour, odour, appearance, and sanitary security. A safe, reliable water supply is crucial for the vitality of the country's economy and quality of life of its citizens. The NWRS2 states that "The reliable supply of water in sufficient quantities and required quality is a crucial input to economic growth and job creation" (DWA, 2013). Poverty reduction is one of the drivers of social and economic development in South Africa. The delivery of water is government's response to the needs of the poor because improvement in access to basic water and sanitation is a first step towards improving the quality of life (DEAT, 2006).

Reliability of water is measured through hydraulic reliability (quantity of water), quality reliability and infrastructure reliability. Water services are reliable by water being available in adequate and continuous quantity, combined with continuous good quality, and provided continuously through well-constructed and well-maintained infrastructure. This complies with the National Water Act that aims at ensuring the "right of access to basic water supply" where a "basic" supply is 25 litres per person per day, easily accessible within 200m from the household, and must be reliable (no interruptions longer than 48 hours) and safe to drink".

All households, regardless of income, location or building type, suffer from the consequences of unreliable water supply. However, low income households suffer disproportionately as they are often not able to invest in other means of obtaining water, forcing them to reduce their water use in response to water deficiencies, resulting in health concerns and exacerbation of the poverty cycle. The same holds for sanitation facilities, where the lack of disposable income compel households to rather not have a toilet, or use others facilities, or practice open defecation.

Water is a public good, therefore it is not only the responsibility of national or local government, but also the responsibility of the public to ensure that water, from source to tap and back, is continuously available, appropriately managed, monitored and conserved to ensure reliable and continuous access. Reliable water services will increase the willingness to pay for services, and subsequently will improve the revenue base of the service provider.

Water and sanitation services are appropriate and employ appropriate technologies

The DWS's Strategy for Mainstreaming Appropriate Technologies in the Water Sector adopted the contextual elements as described by Brikké and Bredero (2003), as the technical, community/social, environmental, legal and institutional framework, supported by a financial dimension (see Table 2 below).

Table 2: Critical factors for appropriate water service provision

<u>Legal and institutional framework:</u>	<ul style="list-style-type: none"> - clear policies and strategies that support sustainability; - support activities for operation and maintenance, such as technical assistance, training, monitoring and setting up effective financing mechanisms; - regulation - incentives and penalties to enforce legal requirements; - capacity and capabilities to support and implement services.
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<u>Social factors:</u>	<ul style="list-style-type: none"> - socio-cultural aspects; - individual, domestic and collective behaviour regarding the links between health, water, hygiene and sanitation. - the demand or perceived need for an improved service; - social and emotional acceptability of technologies and services; - the feeling of ownership; - community participation (men/women, social groups) in all project phases, including planning, designing, constructing and managing the services, and in the O&M of the services; - equity in provision of services; - the capacity and willingness to pay; - management through a locally organized and recognized group; - the financial and administrative capacity of management; - the technical skills to operate and maintain the service, implement preventive maintenance activities and perform minor and major repairs are all present in the community;
<u>Environmental factors:</u>	<ul style="list-style-type: none"> - adequate conservation of water for ecological security; - adequate protection of the water source/point; - the quantity of water and continuity of supply; - the quality of the water source (this will determine whether the water needs to be treated, and will influence the technology choice); - the impact of wastewater or excreta disposal on the environment.
<u>Technical factors:</u>	<ul style="list-style-type: none"> - technology selection; - complexity of the technology; - the technical capacity of the system to respond to demand and provide the desired service level; - the technical skills needed to operate and maintain the system; - the availability, accessibility and cost of spare parts; - the overall costs of O&M.

(Adapted from: Brikké & Bredero, 2003).

The financial dimension pertains to the costs and budgeting for the all of the above elements.

Appropriate levels of water and sanitation services focus on providing water and sanitation facilities and services to people within their contexts. This context encompasses the physical and biological environments; social and economic conditions; governance; funding mechanisms and finances, implementation approaches and methods; technologies and technical issues; water demand for sanitation; and waste water management. Thus, the principle of sustainability means that appropriate technology, economic efficiency, social equity and ecological security is supported by the institutional environment and arrangements in the sanitation sector. The DWS's Strategy for Mainstreaming Appropriate Technologies in the Water Sector adopted the contextual elements as described by by Brikké and Bredero (2003), as the technical, community/social, environmental, legal and institutional framework, supported by a financial dimension.

Water and sanitation services are protecting and conserving the environment

Finite resources must be protected from overexploitation and pollution, and facilities and services dealing with excreta and wastewater should ensure a clean and healthy living environment.

Water and sanitation services that are appropriate consider every element of the context in which the services are provided, especially the natural environment in the world of consumerism. Environmental considerations should apply the precautionary principle of prevention of environmental impacts, and secondly, the principle of three R's namely:

- **Reducing** resource requirements, including natural resources, and minimising outputs to the environment.
- **Maximising Re-use** of waste products and outputs.
- **Maximising Recycling** (reclaiming) of waste and effluent components within natural biological

cycles.

In light of the technical and socio-economic complexities around the reduction innovations, reuse and recycling due cognisance will be paid to these issues through participatory engagement of stakeholders to make for sustainable sanitation services. Notwithstanding the aforesaid, sanitation services shall at the very least minimise any negative impacts on the natural environment in line with the existing legislative and regulatory frameworks.

Water and sanitation services are monitored and regulated

Section 155(7) of the Constitution says that “The national government, subject to section 44, and the provincial governments have the legislative and executive authority to see to the effective performance by municipalities of their functions in respect of matters listed in schedules 4 and 5, by regulation the exercise by municipalities of their executive authority referred to in section 156(1) (South Africa, 1994).

Chapter VIII of Section 62 of Water Services Act (1997) says that: “The Minister and any relevant Province **must** monitor the performance of every water services institution in order to ensure compliance with all applicable national standards prescribed under this Act; every water services institution **must** furnish such information as maybe required by the Minister after consultation with the Minister for Provincial Affairs and Constitutional Development; and allow the Minister access to its books, records and physical assets to the extent necessary for the Minister to carry out the monitoring functions contemplated above”. Thus it is a legislative requirement for water services authorities (WSAs) to provide information for the purpose of performance monitoring.

Regulation is *the protection of the consumer and the public interest* by ensuring compliance with minimum national norms and standards, good performance and efficient use of resources (Sigwaza, 2007). The aim of regulation is to monitor and ensure compliance with legislation, regulations and standards designed to ensure the provision of good quality basic services, which are essential for community health and well-being. The aim is to achieve a water services sector that is efficient and financially sustainable; provides universal coverage with services that people want and are willing to pay for; allows a range of different methods of service provision, levels of service, and a choice of service providers; and treats public and private providers in a similar manner. The objective of regulation is to promote the best interests of customers and to ensure fair treatment of Water Services Providers (WSPs).

The key tasks of a regulator is to set and/or interpret rules/standards and, where relevant, grant approvals; to monitor, analyse and publish the results, and to make determinations, enforce decisions and to intervene if necessary. The following are the functions of the water sector regulator, in this instance the Department of Water and Sanitation (DWA, 2008c):

- Economic regulation - to ensure service tariffs that balance affordability with the long-term financial sustainability of the provider, while encouraging efficiency. This is most pertinent for private sector providers.
- Social regulation - to ensure that social objectives, such as universal access and pro-poor service provision, are met.
- Service quality regulation - to ensure reliability, water pressure, customer service and satisfaction, and sustainability.
- Water quality regulation - to ensure that drinking water meets quality standards and does not pose a threat to public health.
- Consumer protection regulation - to ensure a balance of power between consumers and suppliers.
- Environmental regulation - to ensure that some of the costs of water supply are not externalised with negative impacts on the environment, e.g. inadequate treatment of wastewater.

Regulation of water use and services does not exist in isolation of other regulatory functions or domains in the water sector. Overlaps and interdependencies with other key regulatory domains exist, such as technical, environmental, economic, and social regulation. National government sets national

norms and minimum standards and monitors compliance with these. It is the responsibility of water services authorities (municipalities that have been allocated responsibility for water and sanitation services) to set local standards through bylaws, to monitor and enforce adherence to these local bylaws and to regulate water service providers contracted to provide water services on its behalf.

Because of the range of different water management institutions involved in the water cycle and sanitation value chain, regulation approaches and mechanisms are different and are applied differently for the different types/categories of institutions. For instance, the regulation of municipal water tariffs may have a significant impact on municipal budgets (DWA, 2013). Water regulation must therefore be done to ensure an equitable and fair regulatory administration, and must be done with appropriate technical diligence and consultation with water management institutions and their stakeholders.

Monitoring and reporting on the effectiveness, appropriateness and impact of the norms and standards for sanitation services are crucial for sustainability. Sanitation services will be monitored and regulated for effectiveness and appropriateness through adhering to the following:

- **Coherence:** Regulations are complementary, mutually supportive and consistent over time with national regulators, ministries, and provincial and municipal regulators having clearly defined responsibilities.
- **Communication:** Regulators will publish and explain the goals and policies that guide decisions on entry, pricing and other industry matters subject to supervision.
- **Independence:** For effective regulation, agencies will be objective and a-political enforcers.
- **Accountability:** Checks and balances will be in place to ensure that regulators do not become capricious, corrupt, or inefficient. Consumers and affected parties will know who makes regulatory decisions and what guides them, and to voice their concerns to facilitate easy and quick redress if a regulator acts arbitrarily or incompetently.
- **Transparency:** All regulatory rules and agreements, and the principles that guide them will be on public record and accessible to all, not just service providers.
- **Predictability:** Regulators will be predictable and follow the rule of law, and respect precedents and the principle in conforming with past decisions in similar circumstances, unless there is good reason not to do so.
- **Capacity:** The regulator's responsibilities will match its financial and human resource capacity. Financing reflects government commitment to supporting independent regulatory institutions.

Annexure C

Annexure C: Guidelines and standards pertaining to norms and standards for water supply and sanitation services

The services provider, in most instances the water services authority, is responsible for compiling guidelines to implement these norms and standards.

Several implementation guidelines and documents referring to norms and standards for sanitation services provision in South Africa are already available from the relevant government departments and standards institutions. These need to be updated and amended, and are, amongst others, the following:

- *Guidelines for Human Settlement Planning and Design* (CSIR, 2000), also called the Red Book. It is currently under review with a completion date in 2018.
- *Guidelines for Compulsory National Standards, norms and standards for water services tariffs and water services provider contract regulations* (Regulations and guidelines, August 2002, revised in 2016).
- *General Authorisations in Terms of the National Water Act, 1998* (DEA, 2013).
- *Small Waste Water Treatment Works - DPW Design Guidelines* (Department of Public Works, 2012).
- *South African Water Quality Guidelines for Coastal Marine Waters* (DEA, 2012).
- *Local Regulation Guideline: How municipalities can enhance local regulation of water services* (SALGA, August 2011).
- *Waterborne Sanitation Operation and Maintenance Guide*. WRC report TT 482/11 (2011).
- *General information on sludge co-disposal on landfill*, by the DWS (www.dwa.gov.za).
- *Permissible utilisation and disposal of treated sewage effluent*, by DWA (www.dwa.gov.za).
- *National Norms and Standards for the Construction of Stand Alone Residential Dwellings* (1999, revised in 2007).
- *DWAF Guidelines for Sanitation Facilities for People with Disabilities* (2007).
- *Guidelines for the implementation of the National Indigent Policy by municipalities* (dplg, 2005).
- *Municipal Infrastructure Grants Basic Level of Service and Unit Costs: A guide for municipalities* (dplg, 2005).
- *DWAF and DoH National Health and Hygiene Education Strategy* (2005).
- *Guidelines for the development of water and sanitation infrastructure* (DWAF, 2004).
- *Standard specification for domestic and fire water storage and fire water supply for public buildings* (DPW, 2004)
- *The Facilities Regulations* (2004) pertaining to a clean, hygienic, safe, whole and leak-free condition of facilities, and in a good state of repair under Section 43 of the Occupational Health and Safety Act (No. 85 of 1993).
- *Urine-diversion Ecological Sanitation Systems in South Africa* (Austin & Duncker, 2002).
- *Guidelines for the Design, Operation and Maintenance of Urine-Diversion Sanitation Systems* (Austin & Duncker, 2002).
- *Department Of Public Works Standard Electrical, Mechanical and Architectural Guideline for the Design of Accessible Buildings* (Facilities for Disabled Persons) March 2001.
- *Fire security a guide to architects revised*, January 1998, Department of Public Works, REF. F.P.O./G.61/3E.
- *Guidelines for the Provision of Engineering Services and Amenities* issued by the National Housing Board, published by the CSIR, Division of Building Technology, 1995 (ISBN: 0/7988/5206/2).

- *Specification of materials and methods to be used.* (Department of Public Works, 1993).
- *Guidelines for the design and construction of domestic Ventilated Improved Pit toilets* (CSIR).
- *Building School VIPs: Guideline for the Design and Construction of Domestic Ventilated Improved Pit Toilets.*
- *National Building Regulations* promulgated by Government Notice No. R. 1081 of 10 June 1988.
- Regulation 158 of 1980 (Regulations Governing Private Hospitals and Unattached Theatre Units), promulgated in terms of section 44 of the Health Act, 1977 (Act 63 of 1977) as a guideline. The proposed amendment is Regulation R158 (Regulation Governing Patient Care Facilities).
- *A Guide to the Design of Sewage Purification Works* (November 1973) by the Institute for Water Pollution Control (WISA office, Midrand).
- Applicable local and municipal by-laws.
- South African Bureau of Standards (SABS):
 - SANS 10100-2:2014, The Structural Use of Concrete Part 2: Materials and Execution of Work
 - SANS 3001:2014, Soil Testing
 - SANS 966-1:2014, Components of Pressure Pipe Systems (PVC-U)
 - SANS 10252:2012, Water Supply Installations
 - SANS 10142-1:2012, The Wiring of Premises Part 1: Low Voltage Installations
 - SANS 10112:2011, The installation of PE and PVC pipes
 - SANS 10400-S:2011, The application of the National Building Regulations Part S: Facilities for persons with disabilities, Edition 3
 - SANS 10400-Q:2011, The Application of the National Building Regulations – Part Q: Non waterborne means of sanitary disposal
 - SANS 1186:2011, Symbolic Safety Signs
 - SANS 10162-1:2011, The Structural Use of Steel
 - SANS 497:2011, Glazed Ceramic Sanitaryware
 - SANS 310:2011, PE Storage Tanks
 - SANS 121:2011, Hot Dip Galvanising
 - SANS 10400-P:2010, The Application of the National Building Regulations – Part P: Drainage
 - SANS 53121:2009, GRP Storage Tanks
 - SANS 241:2006, The South African National Standards for Drinking Water
 - SANS 52566:2004, Small Wastewater Treatment Systems
 - SANS 10252:2004, Water supply and drainage for buildings
 - SANS 10090:2003 (3rd edn.) Standards South Africa, Pretoria
 - SANS 10100-1:2000, The Structural Use of Concrete Part 1: Design
 - SANS10306:1999, The Management of Potable Water in Distribution Systems
 - SANS 12944-4:1998, Paints and Varnishes
 - SABS1200 DB:1989, Standardised Specifications for Civil Engineering Construction LD: Earthworks (Pipe Trenches)
 - SABS1200 LB:1983, Standardised Specifications for Civil Engineering Construction LB: Bedding (Pipes)
 - SABS 0400 (Code of Practice for the Application of the National Building Regulations)