DIRECT RECLAMATION OF MUNICIPAL WASTEWATER FOR DRINKING PURPOSES

Volume 3: Framework guidelines for public engagement on water reuse

C. Muanda, D. Cousins and A. Lagardien

WATER RESEARCH COMMISSION

TT 735/17

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Volume 3: Framework guidelines for public engagement on water reuse

A Report to the
Water Research Commission

by

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This report forms part of a series of three reports.
Volume 1: Guidance on Monitoring, Management and Communication of Water Quality (WRC Report No. TT 641/15)
Volume 2: Volume 2: Investigation into institutional and social factors influencing public acceptance of reclaimed water for potable uses in South Africa
Volume 3: Volume 3: Framework guidelines for public engagement on water reuse (This report)

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PREAMBLE

Water authorities seek alternative water resources to manage the risk of increasing water stress. Reclaiming wastewater to help meet the growing demand for potable water has becoming a necessity in the context of rapid urbanisation. The findings of research conducted by the Community Water Supply and Sanitation Unit has shown that water users are more likely to accept the idea of consuming reclaimed water if trust is built between municipalities and the public.

This guideline has been developed to address public resistance at sequential stages of the institutional process for introducing reclaimed water, by dealing with underlying public knowledge gaps and engagement challenges. It enables municipalities to understand specific public knowledge gaps that may underlie negative perceptions. This understanding will enable water institutions to develop appropriate public engagement initiatives that progressively shift public resistance through conditional acceptance towards promotion.

The guideline comprises four stages:

- Stage 1 calls for water services providers to enhance social learning about water scarcity and conservation in a specific demand and supply context, ahead of decision-making;
- Stage 2 ensures public understanding of the comparative benefits of reclaimed water and how wastewater effluent may be effectively treated to meet drinking water quality standards;
- Stage 3 confirms that reclaimed water is safe for consumption and reassures the public of municipal operational and supply capabilities;
- Stage 4 conveys departmental responsibilities for safety and regularly relays the results of testing the quality of drinking water as evidence of compliance with health standards.

Planning in each specific municipal environment paves the way for subsequent preparation, decision-making, implementation and monitoring, by addressing public resistance via a three-fold approach in which the aim is to:

- Understand public knowledge requirements that may underlie negative public perceptions:
  - Sequential stages of the institutional process and public perceptions that may arise as a result of stage-related knowledge deficits are clarified;
  - A framework for conducting a survey of public knowledge requirements at specific stages is provided;
  - Guidance for the development of material to address surveyed public knowledge requirements is provided.

- Develop appropriate public engagement initiatives, based on specific knowledge requirements:
  - A framework for appropriate engagement activities with the general public and specific target groups, based on local case studies, is provided.

- Evaluate the outcomes of the knowledge survey and public engagement initiatives prior to moving to the next stage.

The Guideline provides an approach that is adaptable to variables within particular municipal contexts.

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LIST OF ACRONYMS

BD	Blue Drop
CBO	Community-Based Organisation
CSO	Civil Society Organisation
DWAF (DWS)	Department of Water Affairs & Forestry (now Department of Water and Sanitation)
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
FAQs	Frequently Asked Questions
FGD	Focus Group Discussion
GD	Green Drop
I&AP	Interested and Affected Parties
IDP	Integrated Development Planning
IWRM	Integrated Water Resource Management
NGO	Non-Governmental Organisation
NWRS	National Water Resource Strategy
O&M	Operation and Maintenance
SANS	South African Bureau of Standards
WHO	World Health Organisation
WRC	Water Research Commission
WSDP	Water Service Development Plan

LIST OF TERMS

Direct reuse	:	Direct reuse involves the reuse of treated or untreated wastewater effluent by direct transfer from the site where it was produced, to the site of the new or different beneficial application.
Indirect reuse	:	Indirect reuse comprises the reuse of treated or untreated wastewater from a surface water or groundwater body where it was discharged to with the intention of reuse, before being abstracted for reuse at a new or different site of beneficial application.
Non-potable reuse	:	Non-potable reuse is the reuse of treated or untreated wastewater for purposes other than drinking, such as irrigation or cooling.
Potable reuse	:	Potable reuse involves the reuse of wastewater for drinking purposes after it has been extensively treated by a number of processes to produce water that is safe for human consumption.
Wastewater	:	Wastewater is any water that is derived from a variety of possible uses of the water, and typically contains residual pollutants associated with the use of the water.
Water reuse	:	Water reuse comprises the utilisation of wastewater or effluent from a variety of sources (e.g. domestic wastewater, industrial effluent, mine effluent) for a new or different beneficial application, such as for drinking purposes, industrial use or irrigation.

CHAPTER 1: BACKGROUND

1.1 INTRODUCTION

Increasing demand for potable water appears to be associated with rapid urbanisation across Africa (UN-HABITAT, 2013). In South African cities and towns, where municipal water services' ability to meet rising demand is affected by expectations of free basic services to the economically marginalised, how do water services institutions move away from a "Decide, Announce, defend" (DAD) approach to encourage public acceptance of the potable use of reclaimed water? Addressing this question, Adewumi et al. (2011) used the concepts of trust, attitude and control as measures for predicting the public's intention to reject or accept non-potable domestic and non-domestic uses of reclaimed water in South Africa. Their study found that the key factors underlying public perceptions are knowledge of advantages, degree of control over sources, and trust in the service provider – in addition to other context-specific, subjective norms. Although assessing the subjective norms of respondents lacked a reliable scale, it was found overall that in South Africa water reclamation would profit from addressing factors underlying public resistance prior to implementation.

Finding and guiding ways to enable water service providers to overcome a persistent "disgust" that dominates public perceptions, proceeded from our hypothesis that a public knowledge deficit impedes public acceptance of benefits. Although knowledge sharing is entwined with engaging the public to build trust, its translation into application is simplified into objectives and adaptable actions. Application of the recommended Guideline applies to different project stages, located in conditions that may differ. Steps at each stage are unpacked for local authorities to adapt appropriately in each context. This report fulfils the intention of the research by proposing knowledge-sharing and public engagement processes for a municipal audience. According to comparative evidence drawn from across the different cases, ways to improve knowledge sharing and public engagement to overcome challenges should be guided by alignment with stages in the institutional process.

1.2 SUMMARY OF FINDINGS FROM CASE STUDIES

Drawing from suggested actions across the case studies, a generic guideline for addressing public perceptions was developed as an institutional process for initiating potable water augmentation schemes. The guideline addresses knowledge sharing and public engagement generically, as hypothesised for the research. Each of the stages in the institutional process is accompanied by guidance and suggested mechanisms for addressing public perceptions. Two key issues are covered, the purpose of the stage and the actions to be undertaken. The frequency of action to address public perceptions is based on the idea that when people are aware of challenges, the likelihood of their accepting solutions is greater. Action to be taken in response to fears, safety concerns, and trust building, is summarised thus:

- Overcoming fear:

When people are informed about a municipal decision to use water reclamation as an augmentation option**,** **fear** is the primary underlying feeling that leads to resistance or rejection. This can be overcome by conveying information about the benefits, safety and cost-effectiveness of reclaimed water:

- Explaining the choice of treatment that addresses both water scarcity and risks;
- Sharing positive experience of examples successfully implemented over time;
- Using positive messages in media and influential personalities to communicate safety;
- Holding public meetings to gain insight into public knowledge deficits;
- Educational outreach and promotional campaigns.

- Addressing safety concerns:

Safety is a key determinant of degrees of acceptance of reclaimed water. The key issue on which the public needs reassurance concerns the ability of treatment to produce water that is healthy to drink. The public is interested in facts and figures to increase their confidence, so the emergent generic strategy suggests that safety concerns are addressed by:

- Demonstrating the treatment process in stages and treatment capability;
- Presenting previous experience from other areas. Where applicable, testimony should be heard from those who have been using similar technology;
- Disclosing fail-safes and back-up plans to demonstrate the readiness of the municipality to deal with unforeseen circumstances;
- Clarifying roles and responsibilities, lines of communication and reporting;
- Presenting and demonstrating water quality control and monitoring schedules in terms of timing, responsibility, communication and oversight/control mechanisms.

- Building trust:

When reclaimed water is implemented, the public is interested in the water service provider's ability to ensure that water quality complies with local and international standards. To build **public trust in municipalities** at this stage, strategic actions include showcasing the regular and transparent monitoring of water quality that applies those standards. Thus:

- Adequate and transparent quality control measures are developed and implemented, assuring the public that their fears and safety concerns are relevant and addressed;
- Competent care in water treatment and quality control is demonstrated;
- Monitoring programmes specify responsibilities, control mechanisms, and schedules;
- Disclosure of water quality data on a regular basis is accessible to all, using appropriate mechanisms in context. Any discrepancy in water quality (non-compliance for example) should be disclosed and its impacts communicated to the public.

Details of public engagement processes outlined in the next section of the report are framed as generic guidance for specific application. Details are selected and shaped by each municipality to encompass local diversities across the public realm. Underlying factors that affect public perceptions must be understood by each municipality to enable them to plan effective knowledge sharing and engagement events in context. A municipal survey of public knowledge deficits and requirements is proposed, as a range of reactions from the public is likely to be forthcoming. The survey will provide evidence to inform the municipality's understanding of this range of response and enable the identification of target groups.

1.3 NEED FOR GUIDELINES

Public knowledge acquisition and public engagement are pro-active elements that are key to discursively positioning reclaimed water during the preliminary planning, decision-making, implementation and monitoring stages of project-cycles, in all settings. The objectives of this guideline are to direct municipal actions in ways to overcome public doubts, fears, safety concerns and mistrust by creating enabling spaces in the public realm for meaningful knowledge sharing and active engagement. Apart from understanding deficits in public knowledge, ongoing public resistance may relate to insufficient trust in municipal capabilities. From the outset, water services institutions are advised to ensure greater public understanding of water scarcity risks as the rationale for seeking augmentation options. Understanding public doubts, fears, safety concerns and mistrust should precede scientific and technical explanations of potable quality standards, treatment and ongoing safety mechanisms. According to the findings of this study, an institutional assessment of the status of public knowledge deficits, and thus requirements, at each stage of the institutional process, will enable officials effectively to prepare to address concerns raised in public meetings.

Two-way communication enables knowledge acquisition by institutions, the public and targeted groups, and this will build confidence in municipal decision making. Public acceptance may remain conditional, as safety concerns and trust issues will continue to play out during and after the introduction of reclaimed water. Although geared to address widespread public concerns, the application of this approach may in context serve best to encourage public target groups to relax their resistance to reclaimed water. The guideline may be used to examine attitudinal changes along a continuum of acceptance as the process unfolds, from rejection, through degrees of resistance and conditional acceptance, towards promotion. Public knowledge requirements and public engagement as two-way communication opportunities are to be considered when addressing the "disgust" factor, triggered as it is by the doubts, fears and safety concerns that underlie resistant public perceptions. Opportunities to clarify, agree or disagree, question and interact in discussion, are formative rather than conclusive, engaging all participants in active social learning.

Strategic actions will thus, at each stage of the institutional process, be directed towards an objective that is clearly understood by the public. Each objective specifies what each stage is about and why it is important. Relevant actions are clearly outlined in the table above, guiding the use of available and context-appropriate mechanisms, methods and tools. Regardless of the context in which municipalities and their public are located, strategic actions are guided by generic implications and objectives at each institutional stage of the implementation process. Sharing knowledge through interactive questions and responses in two-way communication events is best designed in context and conducted with reasonable frequency, to significantly shift negative public perceptions beyond acceptance and towards promotional levels. About rendering public engagement an enabling space, the guideline suggests many activities, with mechanisms and tools appropriate to the context in which the public is located. These activities include public meetings, the use of a variety of media, education and awareness campaigns, demonstrations and site-visits, all of which aim to address public doubts, fears, safety concerns and trust issues.

1.4 SCOPE OF THIS GUIDELINE

1.4.1 About the guideline

This guideline is intended for municipalities considering water reclamation as an augmentation option where conventional water resources (river, lakes, groundwater etc.) are constrained, to effectively address negative public perceptions.

1.4.2 Importance of the guideline

Introducing water reclamation is often met with public resistance. This municipal guideline has been developed to address public resistance towards the use of reclaimed water for potable purposes, at sequential stages of the institutional process. It will enable municipalities to understand specific public knowledge gaps possibly underlying negative perceptions and engagement challenges. This understanding will in turn enable municipalities to develop appropriate public engagement initiatives that progressively shift public resistance through conditional acceptance towards promotion. It will also enable municipalities to evaluate the outcomes of their interventions.

1.4.3 What does this guideline do?

Elaborating on the importance of the guideline as summarised in the Section above, the guideline does the following:

a) In terms of public knowledge gaps and engagement challenges, the guideline:
   - clarifies sequential stages of the institutional process and public perceptions that may arise because of stage-related knowledge deficits;
   - provides a framework for conducting a survey of knowledge requirements at specific stages of the institutional process;
   - guides the development of learning materials and mediation opportunities to address the public knowledge requirements identified.

b) In terms of developing appropriate public engagement initiatives, the guideline:
- provides a framework for appropriate engagement activities with the public and specific target groups, based on local case studies;
- suggests two-way communication events and activities that enable social learning.

c) In terms of evaluating outcomes, the guideline:
   - provides guidance on evaluation methods and processes;
   - provides pointers to determine whether outcomes were achieved and movement to the next stage is possible.

CHAPTER 2: GUIDELINES FRAMEWORK

2.1 INTRODUCTION

The Guideline covers institutional stages from a municipal point of view, sharing knowledge required (KR) by the public through engagement (PE) opportunities to:

- Clarify the objectives of each stage of the institutional process with the public;
- Target specific group requirements to secure broad buy-in;
- Enhance public engagement through knowledge-sharing events.

At each stage of the institutional process the framework may be applied to assess KR, apply PE and examine changes in public attitudes along a continuum of resistance towards increasing acceptance.

2.1.1 Preliminary stages

First, water scarcity indicators, risk management issues, reconciliation and feasibility studies, and responsibilities, as well as the rationale for augmenting supplies, must be communicated to ensure public awareness of the status of water resources in each context. When the public is aware of water scarcity, its impacts and related risk management issues, such as current water quality standards, the likelihood of accepting water augmentation alternatives is greater. Having identified public knowledge requirements and taken appropriate actions at the preliminary stage of the institutional process, critical factors underlying public perceptions and responses are addressed in the next three stages, as explained in the next section.

Table 2-1: Preliminary stages of the institutional process: public knowledge acquisition

Stage of the institutional process	What the public need to know		
	Knowledge sharing	Knowledge required	Frequency /Schedule
Planning **Water scarcity and risk management** (What are indications and risk of water scarcity?) How will municipality manage these risks?)	- Water scarcity - Tangible evidence of water scarcity - Risks emanating from water scarcity	- Water scarcity signs - Risks occurring from water scarcity	- Immediately when signs are apparent (e.g. decreasing rainfall, dam levels)
Reconciliation study (Why this study?)	- Reconciliation study	- Purpose and outcomes - Benefits	Before and after study undertaken
Feasibility study (What are purpose and benefits of the study?)	- Feasibility study	- Purpose and outcomes - Criteria	Before and after study undertaken

2.1.2 Reuse decision

Even where people do not doubt the threat of water scarcity and have accepted the outcomes of both reconciliation and feasibility studies, which have been widely shared, the announcement of a reuse decision

is likely to evoke mixed reactions. At this stage of the institutional process, public knowledge of how the reuse decision was made and of treatment efficacy is intended to ease public fears.

Table 2-2: Reuse decision stage: knowledge and public information needs

Stage of the institutional process	What the public need to know		
	Knowledge sharing	Knowledge required	Frequency /Schedule
Reuse decision (How was the decision taken? And what technology has been selected?)	- Basis for decision - Decision-making process - Technology selection criteria and process - Effectiveness of the technology - Treatment process	- How decision was taken - Impacts of decision - Types of technology (O&M, cost etc.). - How the treatment process works to change wastewater into potable water	- Before making the decision - After the decision is made - Regular communication

2.1.3 Implementation

At this stage of the institutional process a water reclamation plant is being constructed and made ready for use. The public would like to know more about the treatment process and the standards against which raw water is purified to drinkable quality. Their information needs at this stage are mainly scientific, pertaining to water quality, the technical capacity of the plant, and the expertise of operational management. The frequency of public communication and engagement is best continuous until the plant is fully operational – prior to, during and after construction. At this stage, it is strategic to create public confidence and increase trust. The launch of treatment operations and distribution to the public provides a valuable opportunity with ongoing currency, if the process is inclusive and knowledge-sharing.

Table 2-3: Knowledge and public information needs at the implementation stage

Stage of the institutional process	What the public need to know		
	Knowledge sharing	Knowledge required	Frequency /Schedule
Implementation (How reclaimed water scheme is designed?) (Are working staff capable of operating the plant adequately?)	- Implementation process - Safety measures - Timeline for implementation - Technical information - Qualifications of plant working and management staffs	- How the scheme will be implemented? - How long it will take? - How the scheme is designed? - Qualifications and competence of staff	- Before appointment of contractor - During construction - After construction has been completed

2.1.4 Post-implementation

Following implementation, the post-implementation stage is more concerned with building trust in the municipality's capacity for plant management. The public needs to be assured of continuous operational safety and that the quality of water will always comply with standards.

Table 2-4: Knowledge and information need of the public and frequency of communication

Stage of the institutional process	What the public need to know		
	Knowledge sharing	Knowledge required	Frequency /Schedule
Post-implementation (Will reclaimed water be safe enough for potable applications?) (What plan is in place in case the plant fails?)	- Monitoring programme/schedule - Water quality monitoring parameters and frequency/process - Water quality results (BD and GD) - Safety measures - Risk management plan	- How the plant will be monitored and by whom? - What are key quality parameters and their significance? - Water quality compliance - Where results can be accessed? - What plan is in place to address failure of the plant?	- Before the plant is commissioned - Continuous (weekly public briefing) - Monthly (water bills) - Yearly using blue drop

Information about the plant's monitoring programme, water quality monitoring system, operational risk management and safety measures should be provided to the public continuously. Here regular reporting might be monthly, for the water quality monitoring report; quarterly, for plant monitoring; twice a year, for plant safety measures; and annual, for the risk management plan. Steps taken at every stage may apply measures to shift public resistance through degrees of conditional acceptance to promotion. Checklists to guide steps and tools derived from extensive research over time are shaped in consideration of factors underlying public perspectives, as well as social issues specific to the context and expressed by target groups. Even when people have accepted the threat of water scarcity and the well-publicised outcomes of the reconciliation and feasibility studies, the announcement of a reuse decision is likely to evoke mixed reactions. Regular communication should be maintained in that public knowledge requirements should be assessed, both before and after the decision is disseminated. Institutional insights may at this stage target groups that require further engagement and information.

As previously indicated, shifting the public's attitude from resistance to conditional acceptance directly concerns people's doubts, fears, safety concerns and trust. It is crucial to understand their knowledge requirements at each stage of the institutional process. The guideline framed below may be used to assess the status at each stage and at a location. Generic public knowledge requirements (KR) and public engagement (PE) methods may at any stage accommodate differences unique to the context concerned.

Addressing public knowledge deficits and public engagement challenges combines certain preliminary activities to prepare for decision-making, implementation and monitoring to unfold, as follows:

- **Planning (water scarcity & risk management; reconciliation & feasibility studies):** the public is informed about water scarcity with tangible evidence and predictor signs through public awareness campaigns and meetings. Then the purpose, outcomes and impacts of the reconciliation and feasibility studies must be explained through public meetings, discussion forums, information centres and media, both before and after the studies have been conducted.

- **Reuse decision:** the municipality's selection of reclaimed water technology should be conveyed, with endorsement of its benefits, the efficacy of the treatment and its cost-effectiveness. Reference should be made to examples of successful implementation, with leaders/celebrities assisting at public gatherings. Information should also be disseminated through discussion forums, school visits, the media and water bills.

- **Implementation:** public knowledge of safety measures, the capabilities of the plant operating staff and management in respect of operating and maintaining the plant, should be shared through public meetings, site visits, information centres, school and general awareness programmes.

- **Post-implementation:** the safety of treated water, monitoring programmes, water quality (water quality parameters, frequency of tests and results), safety measures and risk management plans make use of guided plant visits, information campaigns and road shows.

2.2 FRAMING OF THE GUIDELINE

The guideline suggests that when the institution is sharing knowledge with the public, opportunities must be sought for two-way communication through education and awareness campaigns, incorporating schools, public meetings and site visits. The introduction of water reclamation schemes involves addressing public perceptions by sharing knowledge at interfaces across the public realm. Within each municipal context and at stages, opportunities for public queries and institutional responses will enhance social learning and build trust in public institutions simultaneously. Municipalities may engage with identified target groups to shift public resistance toward acceptance and promotion. Table 2-5 illustrates the framing of the guideline. This guideline is intended for municipalities where conventional water sources are constrained and reclaimed water is being considered as an augmentation option. The guideline enables municipalities to address public resistance by developing an understanding of specific public knowledge requirements underlying negative public perceptions. Based on these requirements, municipalities should develop appropriate public engagement initiatives to shift public resistance through conditional acceptance towards promotion.

The guideline as outlined in Figure 2-1 comprises **four stages** for municipal actions relating to understanding public knowledge requirements and extending public engagement opportunities. An overview of the components of the guideline is provided, as well as further explanation of the details of the sequence of steps or stages.

Key components of the guideline include:

- ***Institutional process and associated themes for engagement***: in a series of steps, each stage anticipates, pre-empts and addresses public resistance.

- ***Prevailing perceptions***: prevailing perceptions that may drive the public to resist or accept reclaimed water are associated with each stage of the institutional process.

- ***KR and FAQs (Knowledge Requirements and Frequently Asked Questions)***: public knowledge that is required to influence perceptions is linked to the questions that are most frequently asked in order to promote understanding of the subject in hand. These questions are associated with each stage of the institutional process and related to prevailing perceptions.

- ***Public Engagement process and medium***: interaction between those who do not understand and those who have knowledge of the subject in hand is referred to as a process of engaging the public, while the medium may be selected to respond to the level of knowledge of the audience. The guideline suggests that means of engagement are associated with each stage of the institutional process in response to each prevailing perception.

- ***Desired outcomes***: each stage of the guideline is expected to produce results. Expected outcomes are therefore shifts in public perceptions that allow people to move from their current thinking to more progressive thinking.

Table 2-5: Guideline: framework for application

Stages Social issues	Approach to introducing potable reclaimed water	Strategic components		Public engagement process	
		KR	PE	Event/s	Medium/s
Planning Water scarcity and risk management Denial/Doubt	○ Identify water scarcity signs ○ Inform the public about water scarcity ○ Develop risk management plan ○ Inform the public about risk management plan ○ Train the public to adapt to risk management plan	Inform about water scarcity Provide tangible evidence of water scarcity Communicate risk management plans	Public awareness Participate in meetings Address issues and concerns Public advisory board Education programme	School programme Public relations campaign	Presentation-facts Posters -with facts Media Flyers a Advert Posters Water bill Billboard
Reconciliation study Doubt	○ Inform the public about the purpose, outcomes and expectations ○ Engage the public through information sharing session ○ Select members of the public to be involved in the study	Inform public about purposes, outcomes and impacts (before and after)	Discussion forums Public meetings/ dialogue Education programme	Discussion forum Public meetings Educational events	Information centre Posters Media
Feasibility study Mistrust	○ Identify stakeholders to engage with ○ Outline purpose, expected outcomes. impacts of study ○ Inform the public about the study ○ Conduct the study ○ Publish the study outcomes ○ Inform/explain outcomes to the public	Inform public about purposes, outcomes and impacts (before and after)	Discussion forums Public meetings/ dialogue Public advisory board Education programme	Discussion forum Meetings Dialogues	Presentation Poster Media Water bills
Reuse decision Fear	○ Outline decision-making process ○ Outline criteria used to decide on reuse ○ Explain the decision-making process ○ Inform the public about the reuse decision	Basis for decision Practicality of RW Types of information for the public	Media - promote Use of community structure, councillors Public meetings Education programme	Information campaign Road show Public meeting	Leaflets Billboard Poster Presentation

Implementation Safety	○ Present the implementation ○ Outline the treatment process ○ Discuss the cost of the process ○ Present and discuss back-up plan	Treatment process Previous experience Testimony (figures & facts) - WQ results Back-up plan O&M Responsibility Monitoring process and responsibility	Media Use of community structure, councillors Public meetings School awareness Lab visit (WQ tests) Plant visit (process operation)	Presentation Demonstration Awareness Discussion forum Public meeting Plant visits Educational events	Poster Pamphlets Presentation Showcase Media
Post-implementation Trust	○ Develop a list of water quality parameters of relevance in relation to water quality ○ Develop and present the plant and water quality monitoring plan ○ Develop schedule for publishing water quality results	Quality control measures. Monitoring programme WQ data disclosure LoS agreement	Media Use of community structure, councillors Public meetings Education targets Site visits (plant, lab)	Launch Plant visits Lab visits Road show Information session	Presentation Posters Banners Testimony Booklets

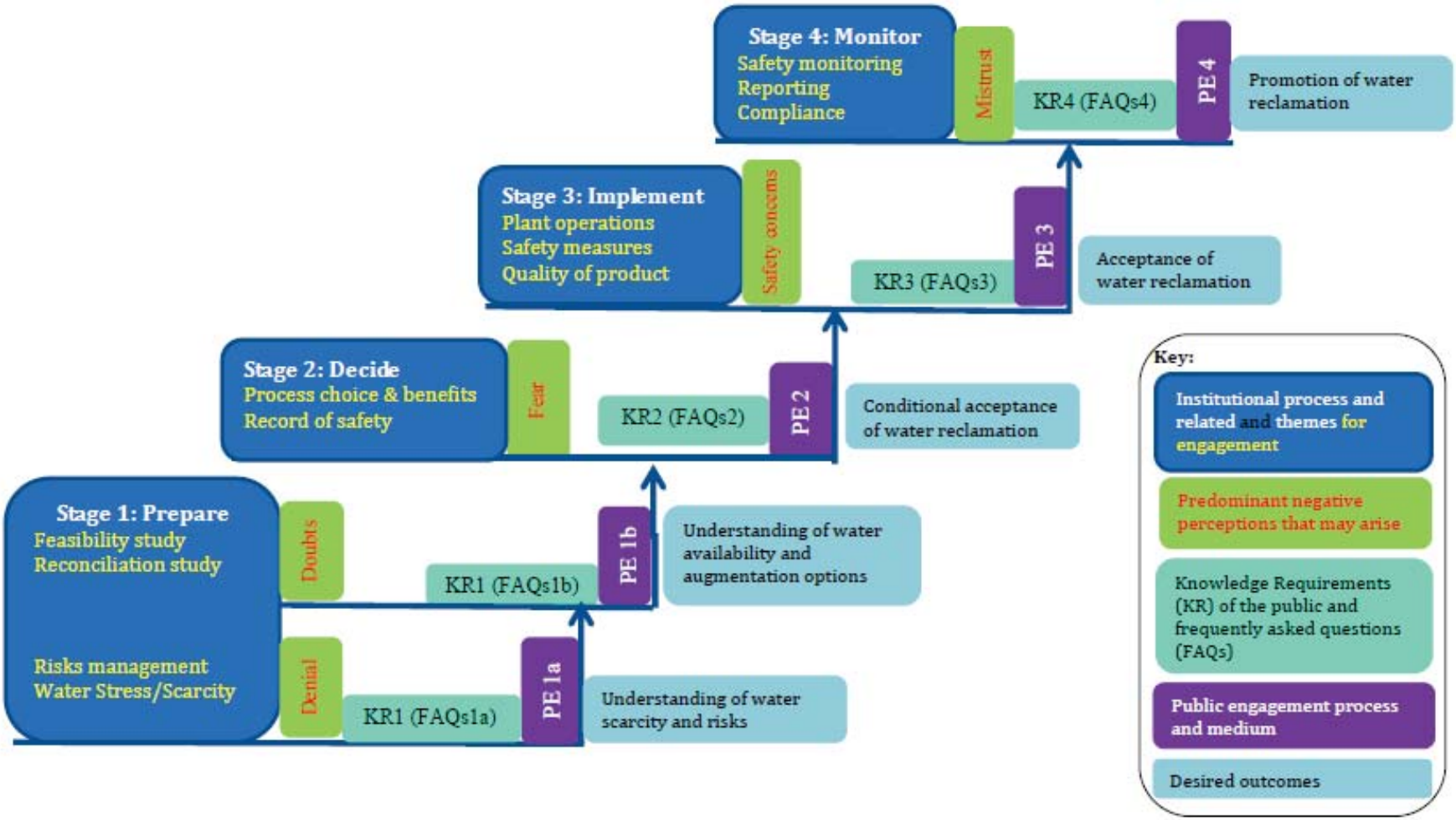


Figure 2-1: Overview of the guideline

The four stages of the guideline outlined in Figure 2-2 comprise the following:

2.2.1 *Stage 1: Prepare*

Introducing water reclamation for potable applications calls for water services institutions to enhance public awareness of sources of water and their use, the water cycle, scarcity and conservation as well as risk management. This should be done as part of an inception phase ahead of any decision-making, meaning that water institutions should first conduct a survey to ascertain public understanding of the themes outlined above. This stage may anticipate some extent of **denial,** disbelief or scepticism in the public realm, which may underlie **doubts** about municipal seriousness. Educational outreach to the broader public spectrum, or specific targeted groups, is a precondition for the shifting of public attitudes.

Key knowledge and engagement themes covered at this stage include:

- **Water scarcity and risk management** (sources of water, its use, the impact of water stress, the risks of water scarcity, and plans and strategies for managing such risks);
- **Reconciliation study** (balancing water demand and supply over time, and water augmentation options to consider);
- **Feasibility study** (listing available and feasible water augmentation options for the context).

This stage entails:

- Collating information relating to public knowledge and developing materials that cover themes including water scarcity and levels of stress, associated risks and a management plan; outcomes of the reconciliation (overview of water availability) and outcomes of a feasibility study (listing available and feasible options for the context);
- Identify target group(s)[1] for a public knowledge survey and engagement;
- Selecting appropriate mechanisms and activities for public engagement as informed by the findings of the survey;
- Evaluation of outcomes (shift from denial and doubts) prior to moving to the next stage.

2.2.2 *Stage 2: Decide*

After the preparation stage, public opinion may be moving towards challenging the decision to implement water reclamation as a water augmentation option. Such a challenge would be mainly driven by fears arising from the decision to introduce water reclamation. **Fears** derive from a lack of public understanding of how wastewater effluent may be treated to potable standards. Public understanding of the criteria that led to the decision in favour of reclaimed water and the technology involved includes knowledge of the benefits and effectiveness of the treatment process, distribution plans, equity and comparative costs.

This stage involves a decision-making process during which water reclamation is to be introduced. The main themes covered include:

- Reclaimed water for potable application
  - ✓ Choice of water sources – key considerations
  - ✓ Environmental benefits and costs
  - ✓ Water reclamation – examples of successes
- Water quality regulations and standards

[1] Refers to a category of the public who might have certain perceptions or who might help disseminating knowledge or supporting the initiative (typical target group for each stage is presented in Table 1).

- ✓ Compliance with drinking water quality standards
- ✓ Precautions and fail-safes
- ✓ Safety and trustworthiness of water reclamation scheme.

This stage suggests that to allay fears emanating from the decision to introduce water reclamation, the rationale for this alternative augmentation option should be conveyed to the public by:

- Collating information regarding public knowledge and developing materials covering the themes referred to, above;
- Explaining the rationale for the municipal decision to introduce reclaimed water and the particular treatment technology to be used;
- Selecting appropriate mechanisms and activities for public engagement;
- Evaluating outcomes (shift away from fears) prior to moving to the next stage.

2.2.3 *Stage 3: Implement*

During implementation, the public would like to know that construction, management and operation of the plant ensures that water quality and health standards are maintained. At this stage, public resistance to reclaimed water is engendered by the feeling of unsafeness (safety concerns). Such safety concerns may be attributed to a lack of knowledge about the treatment of wastewater effluent to bring it up to drinking water standards.

This stage covers themes including:

- ➢ Water treatment process
  - ✓ Treatment capability of the technology and
  - ✓ Capability of plant operating staff

- ➢ Water quality standards
  - ✓ Quality standards to determine fitness of drinking water for human consumption
  - ✓ Compliance with local and international standards.

This again entails collating information about public knowledge, as well as sharing knowledge and demonstrating municipal capability to implement the water reclamation scheme.

This stage intends to address underlying perceptions of unsafeness that may be present among the public by attending to the following:

- Demonstrating the municipal capability to construct, operate and maintain the treatment plant;
- Demonstrating safety and fail-safe measures on site;
- Selecting appropriate mechanisms and activities for public engagement;
- Evaluating outcomes (shift from unsafeness) prior to moving to the next stage.

2.2.4 *Stage 4: Monitor*

As knowledge required by the public at this stage is directly related to assurance of the safety of water they use, they need to know about the monitoring programme, plant management capabilities and compliance with water quality standards. In addition to assurances that water services institutions undertake frequent testing and reporting, the public requires sufficient understanding of monitoring systems and the results of testing. Demonstration of transparent and regular reporting will enhance public acceptance of the safety of treated water and build trust in municipal management.

This stage focuses more on the **water quality monitoring** to ensure public trust in water quality compliance and safety, the scheduling and reporting of results, and evidence of results and governance (Blue Drop certification). Once a plant is operational, building public **trust** is addressed by timing communication and engaging the public to facilitate understanding of monitoring, testing and compliance. Key tasks involved at this stage include:

- Collation of public knowledge information and development of a knowledge base comprising materials that convey evidence of compliance with drinking water quality standards, monitoring processes and maintenance plans (breakdown and back-up);
- Selection of appropriate mechanisms and activities for public engagement and mediation of learning;
- Evaluation of outcomes (shift from mistrust).

2.3 COMPONENTS OF THE GUIDELINE

A flow diagram below (Figure 2-2) provides an overview of components of the Guideline where institutional stages are translated into actions or steps, with a summary of the knowledge to be shared with the public and tools that may be applied for this purpose. The public promotion of the potable use of reclaimed water is the desired consequence of this study's suggestions for improvements. Drawing on the experience of the three case study areas, many gaps were identified in the desired shifting of public resistance from outright rejection towards the promotion of reclaimed water.

This framework may be used to assess the status at each stage in the implementation process and at a location. Generic public knowledge requirements (KR) and public engagement (PE) methods may at any stage accommodate differences unique to the context concerned. The guideline presented in this chapter shows that within each municipal context and at stages, using opportunities for public queries and institutional responses can simultaneously enhance social learning and build trust in public institutions. Municipalities may engage with identified targets groups to shift public resistance toward acceptance and promotion.

The guideline is intended to enable two-way communication by addressing public knowledge requirements (KR) and responding to social concerns through public engagement (PE) across social networks. Successful water reclamation schemes can be achieved if public knowledge deficits are addressed through understanding public knowledge requirements (KR), and if the water service provider engages with the public at each stage of the institutional process. At each stage of the institutional process the framework may be applied to assess KR, apply PE and examine changes in public attitudes along a continuum of resistance towards increasing acceptance to evaluate outcomes.

2.4 SUMMARY

The guideline provides guidance for each stage (Table 2-6) of the institutional process regarding:

- Typical target groups for both survey and knowledge dissemination;
- Questions for the survey (FAQs) based on a knowledge requirements survey;
- Methods to conduct the target group's survey (first level engagement);
- Typical materials relating to the knowledge requirements of the surveyed public;
- Methods to engage the public and related events (second level engagement).

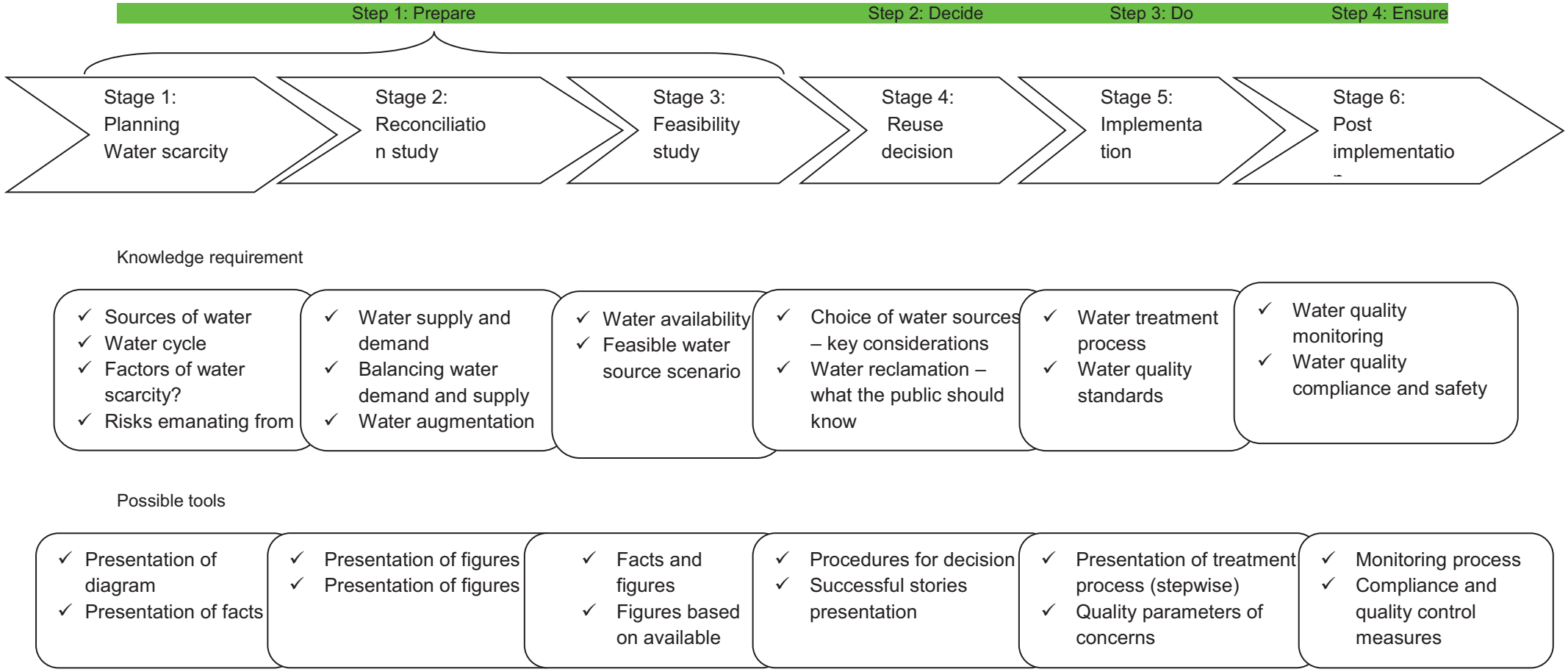


Figure 2-2: Components of the guideline and public knowledge material

Table 2-6: Guideline framework – links between stages, process and outcomes

Steps in **Stages**	Target groups	Knowledge Requirements (KR)		Public Engagement (PE)		Evaluation of outcomes and process		
		Knowledge	Results	Event/Mechanisms	Results	Outcomes	Knowledge	Engagement
Prepare Water scarcity Reconciliation study Feasibility study	 Support NGOs Journalists, ward committee, politicians, leaders (religious & traditional), council CSOs, users, education institutions	FGD of target group reps; interviews FAQs 1a Water scarcity & risks FAQs 1b Supply vs. demand FAQs 1c Feasible options	Knowledge of water scarcity and risks management, water demand and availability, feasible options Themes for materials, learning mediation & snowballing target	Public participation process in context: media briefings, meetings, road shows, workshops, campaigns Mediated learning: questions arising	Collated public queries and professional responses Understanding of public knowledge related to FAQs1 and specific target groups	Change of perceptions in context (shift from **Denial /Doubts**) Shortfalls of knowledge survey, target group choice and means of engagement	Adequacy of knowledge survey and materials, relevance of target groups & extent of knowledge acquisition	Public understanding of the themes (see FAQs1) Engagement mechanisms, events and mediation Informed plans: events, mediation
Decide	Politicians, council, ward committee, media and celebrities Support NGOs, CSOs, users, residents, schools	Survey, interviews, target focus groups FAQs 2 Process choice & benefits Record of safety	Knowledge of water treatment and WQ regulations; examples – success of water treatment Themes for materials and learning mediation &	Focus Group Discussion (meetings and workshops) demonstration, poster and photo /video show Mediated learning: questions arising	Collated public queries and professional responses Understanding of water treatment technology and compliance (see FAQs2),	Change in perceptions in context (shift from **Fears**) Shortfalls of knowledge survey, target group choice and means of engagement	Adequacy of knowledge survey and materials, relevance of target groups & extent of knowledge acquisition	Understanding of water treatment technologies, process choice Effectiveness of engagement events; informed plans: target groups events, mediation

			snowballing target		specific target groups			
Implement	Media, politicians, celebrities. NGO, CSOs, users, residents, schools	Survey, interviews, target focus groups FAQs 3 Plant operations Safety measures Quality of product .	Understanding of plant operations and safety measure to ensure WQS compliance Themes for materials and learning mediation & snowballing target	Public meetings, Focus Group Discussion Guided plant visits, presentation (poster, video & photo show)	Understanding of water treatment process, WQS and compliance (see FAQs3) Collated public queries and professional responses; and specific target groups	Shifts in perceptions (from **unsafety**) Shortfalls of knowledge survey, target group choice and means of engagement	Adequacy of knowledge survey and materials, relevance of target groups & extent of knowledge acquisition	Understanding of plant operations & compliance with WQS Appropriateness of engagement events & mediation
Monitor	NGOs, CSO networks, schools, media, politicians, celebrities	Survey, interviews, target focus groups FAQs 4 Safety monitoring Reporting Compliance	Monitoring process and results: WQ parameters Evidence of compliance	Public Meetings. Focus group – targets. Guided plant visits: Demonstration of reporting process Compliance mechanisms	Understanding of safety monitoring, reporting and compliance (See FAQs4) Collated public queries and professional response.	Shifts in perceptions from **mistrust** Shortfalls of knowledge survey, target group choice and means of engagement	Adequacy of knowledge survey and materials, relevance of target groups & extent of knowledge acquisition	Understanding of safety monitoring reporting & compliance Appropriateness of engagement events & mediation

Abbreviations: CSOs: Civil Society Organisations; FAQ: Frequently Asked Questions; WQ: Water Quality; WQS: water quality standards; FGD: focus group discussion

CHAPTER 3: APPLICATION OF THE GUIDELINE

3.1 INTRODUCTION

Potable applications of reclaimed water have the potential to address growing water demand, despite existing institutional and social challenges. Environmental and developmental beneficiation of water reclamation as a potable water augmentation alternative is a subject for social learning that municipalities are well placed to foster. The guidance provided in this guideline will enable municipalities to understand specific public knowledge gaps that may underlie negative perceptions, thus equipping them to conduct appropriate public engagement initiatives to address public resistance.

As the extent of public resistance may become manifest at different stages of the institutional process, the sharing of required knowledge and appropriate public engagement are aligned with logical stages to address predominant perceptions generating public resistance, as follows:

- Planning stage – addresses denial and doubts
- Reuse decision stage – addresses fears
- Implementation stage – addresses public safety concerns
- Monitoring stage – addresses mistrust.

Public resistance often reflects deficits in public knowledge, which are arguably the consequence of ineffective public engagement on the part of municipalities. Therefore, understanding the questions underlying negative public perceptions as public Knowledge Requirements (KR) is led by themes relating to each key stage of the institutional process. The effects of negative public perceptions may be placed on a continuum of acceptance between *rejection* (the lowest point of public acceptance) through conditional *acceptance,* and towards *promotion* (the highest point of public acceptance).

As illustrated in Appendix 1, the link between the institutional stages and the continuum of acceptance will depend on municipal actions and activities undertaken at each stage, and on the conditions, norms and dynamics within each municipal context. This link also affects the choice of knowledge themes and public engagement initiatives at each stage, to reach the desired outcomes. The effect of **denial** or **doubts** and **fear** manifest as public rejection or some extent of resistance, whereas public perceptions of **unsafeness**[2] contribute to **mistrust** in municipal solutions. The continuum clarifies negative perceptions relating to institutional processes and the knowledge that may overcome them. Municipal initiatives may progressively shift public rejection or resistance through conditional acceptance towards promotion.

Guidance at each stage indicates what knowledge is required by the public, to enable the municipality to plan and prepare public engagement opportunities that encompass:

- Identification of target groups in each municipal context;
- Clarification of the objectives of municipal actions at each stage;
- Evaluation of outcomes by subsequently examining changes in public perceptions.

[2] The state or condition of being unsafe (www.yourdictionary.com)

3.2 PROCESS FOR IMPLEMENTING THE GUIDELINE

The generic process for implementing each stage of the guideline is presented in (Figure 3-1). The implementation process is as follows:

- Identify the stage of the institutional process
  - Identify prevailing perception and related public response;
- Identify target groups (people with negative perceptions and those who are knowledgeable);
- Conduct a knowledge survey using relevant FAQs (to identify specific knowledge required by target groups);
- Identify available or develop mechanisms of engagement (relevant to the knowledge requirements of the public), develop materials, design events and engage the public;
- Evaluate the outcomes of both knowledge survey and public engagement mechanisms and assess changes in perceptions:
  - In case of unchanged perceptions – review the process (target groups, knowledge survey and public engagement mechanisms);
  - In case of improvement in public perception – proceed to the next stage.

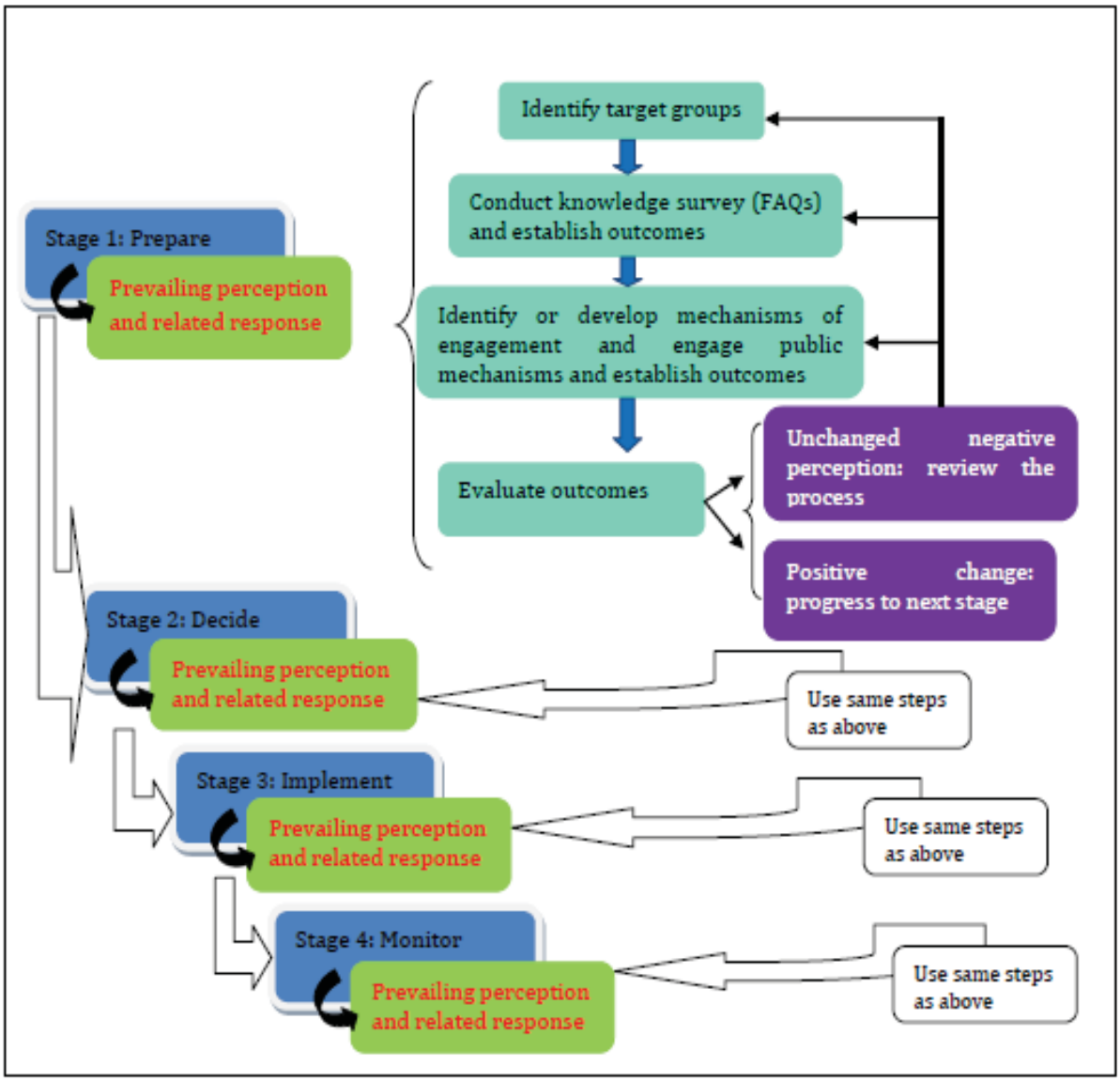


Figure 3-1: Flow chart describing sequential implementation of the guideline

The same process should be applied to each stage until change in perception has been attained. Further details of the application of this guideline are presented in the next section.

3.2.1 Stage 1: Prepare

The preparation stage entails managing risks emerging from the shortage of available water, and finding alternatives sources and strategies to deal with water demand issues. It addresses the denial and doubts that often lead to public rejection of water reclamation. These perceptions may occur when water scarcity is identified and a risk management plan introduced. To overcome these perceptions, the guideline suggests the steps illustrated in Figure 3-2.

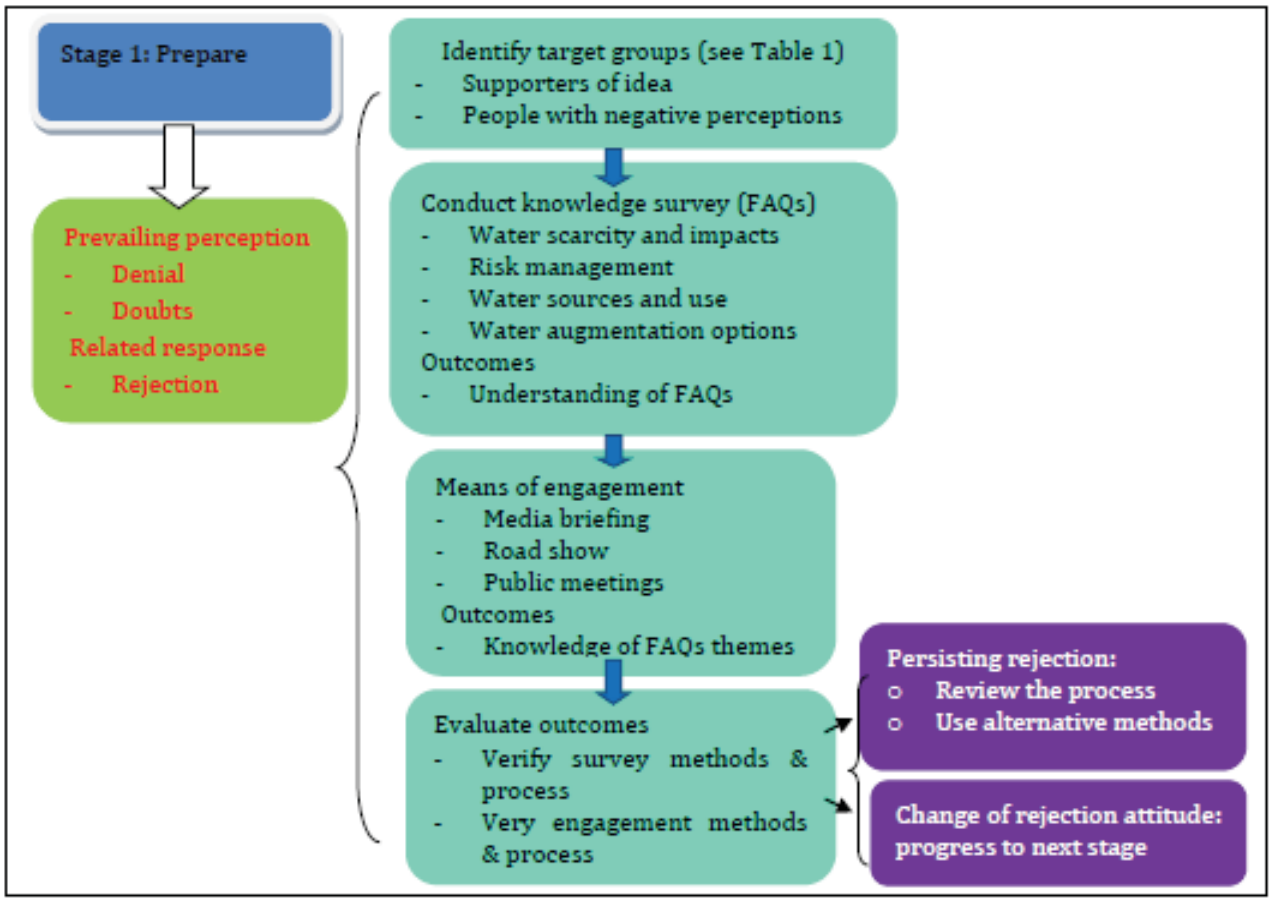


Figure 3-2: Flow chart describing implementation of the Prepare stage

To address these perceptions when the outcomes of reconciliation and feasibility studies have been made public, the guideline proposes the following steps:

3.2.1.1 Survey of knowledge required

A survey is intended to investigate what the public knows about water scarcity and risk management, reconciliation and feasibility studies, as well as which sectors are informed and which not (target groups). The survey assists in identifying target groups and informs the content, design and production of information that is accessible to the broader public.

- Identification and selection of target group(s):
  - Randomly ask public questions about their background (qualifications, employment, position, religion, income and residence)
  - Use this demographic information to broadly classify target groups (preliminary identification of target groups)
- Assess public knowledge requirements (need):
  - Conduct a survey[3] (see Box 1 – outcomes of survey) using Table 3-1 FAQs of public knowledge gaps across the public realm to identify knowledge gaps to focus on;
  - Link identified knowledge gaps[4] to each target group;
  - Analyse the knowledge gaps of surveyed individuals against the target group to confirm their category (including perception or support group). This analysis provides an indication of priority or typical target. It is based on whether surveyed individuals support the water reclamation initiative or express negative perceptions that need to be addressed.

Table 3-1: Stage 1 Frequently Asked Questions (FAQs)

Theme	FAQs
Water scarcity and risk management	✓ How is water scarcity recognised? ✓ What causes water scarcity? ✓ What are the greatest impacts and risks of water scarcity to the public? ✓ How are risks managed during water scarcity periods and why?
Reconciliation study	✓ What is reconciliation and why it is important? ✓ What is the meaning of the outcomes of this study? ✓ Who should be involved in this study and does the public have a say in this study? ✓ Is current water supply and demand equivalent/ balanced? ✓ What are the potential water augmentation alternatives?
Feasibility study	✓ What does a feasibility study entail? ✓ How important are the outcomes of this study to the public? ✓ How should these outcomes be communicated to the public? ✓ Is water available? ✓ What are the feasible water scenarios?

Note: priority target groups for this stage include NGOs and CSOs, residents of the area, and learning institutions, media, politicians and community leaders.

- Develop knowledge dissemination materials
  - Group knowledge gaps into themes and subthemes (as related to Table 2 FAQs)
  - Respond to each FAQ in a sequence suggested in Table 3-1 to compile the content (see themes covered by the stage in section 2.25)
  - Decide on the type(s) and format of informative materials (e.g. poster, leaflet, flyers, brochures or billboards, etc.)

[3] The nature of the survey depends on the category of target groups and can be conducted via individual interview, focus group discussion or public meeting during which questions and responses are allowed.
[4] Priority target groups should be sectors of the public with negative perceptions of reclaimed water or with positive perceptions and a willingness to support the dissemination of information or knowledge.

Box 1 - Outcomes of public knowledge survey

- ✓ Identification of target group(s): people with negative perceptions and supporting agent(s)
- ✓ Knowledge requirements of the public (as per themes in Table 1)
  - Public understanding of water scarcity and related risks, and risks management plan
  - Public understanding of available water versus demand
  - Public understanding of available water scenarios to address demand
- ✓ Typical materials for knowledge dissemination and uptake (as per themes in Table 2)

3.2.1.2 Engage public

How people engage with the issues that they encounter will determine the questions to be considered in municipal responses. Engaging the public at this stage entails the following:

- Select or develop public engagement method(s)
  - Identify and list the public engagement means[5] to be used in the municipal context
  - Match identified means to developed materials (according to their themes)
  - Select the means of engaging the public that match the theme and sub-themes (based on the ease of conveying information and capturing the attention of the target group)
  - Select the types of media for engagement (e.g. presentation, factsheet, multimedia, sms, Instagram, Facebook, etc.)

- Identify public events and develop appropriate processes of engagement

Developing processes and events appropriate to each municipal context aims to engage the target groups productively. The following steps are suggested:

- Identify and list events typically occurring in the area/context
- Use the selected means of engagement for the mediation of themes and sub-themes
- Assign event(s) to selected means of engaging the target groups
- Design processes of engagement to occur during the event (schedule and sequence of events) and in the media

- ***Engage the public (target groups)*** (see Box 2) - engagement will depend on the means selected:
  - Notify target groups (using available means, e.g. billboard, notice board, leaflet, etc.)
  - Convene meetings or conduct interviews (as per schedule developed above)
  - Conduct events that allow for questions, responses and the mediation of learning

Box 2 - Outcomes of public engagement

- ✓ Means of public engagement are related to preparation stage knowledge themes
- ✓ Processes for engaging the public
  - Focus group discussion and public meeting for people with negative perceptions
  - Interview for support agents
- ✓ Events relating to knowledge themes

[5] Means for engaging the public can vary according to the category of target group(s). (See Table 1 above for illustration.)

Note: Means of engagement include (but are not limited to) public meetings, workshops, discussion forums, educational programmes and the pro-active use of (interactive) media, such as radio. The media can consist of presentations, factsheets, descriptive notes, posters, etc.

3.2.1.3 Evaluation of outcomes

Prior to moving to the next stage, an evaluation of the outcomes, including knowledge acquired and changes in perception, is required (see Box 3). This evaluation should be done through a survey using the target group that has negative perceptions. The survey should be conducted using the very same methods and FAQs as were used during the knowledge survey step.

Box 3- Results of the evaluation of outcomes

- ✓ Knowledge acquired
  - Understanding of water scarcity and impacts
  - Understanding of risk management to address water scarcity
  - Understanding of water sources and use, water availability
  - Understanding of water reclamation as augmentation option
- ✓ Shift in perception
  - Status quo of public perception (no denial and doubts amongst target groups)

Notes:

- ❖ This stage should be facilitated by water institution officials in charge of water services, communication, community liaison or public participation and education.

- ❖ Assess target group/s in terms of the knowledge that different groups require, as determined by the survey.

- ❖ When there is no change of perceptions, a review of the entire process is indicated, by:
  - Reconvening the knowledge survey by revisiting FAQs and refining survey methods
  - Refining the identification and selection of target group(s)
  - Refining methods for evaluating outcomes
  - Using alternative methods.

- ❖ Moving to the next stage is subject to the evaluation of outcomes, to ensure successful results. Acceptable outcomes required to proceed to next the stage include:
  - Understanding of themes covered at this stage (water scarcity, risk management, water sources, use and availability and water augmentation options)
  - Change in perception from doubt and denial to acceptance

- ❖ Outcomes are evaluated by:
  - Reconvening the survey by asking same questions used initially;
  - Checking people's attitudes by evaluating their responses to the questions and establishing whether any change in perception has occurred. Positive change is registered when the individual interviewed evinces an informed acceptance of issues that were a concern before s/he was engaged.

3.2.2 Stage 2: *Decide*

The second stage of the institutional process entails deciding on water reclamation as a feasible and suitable option for the local context. At this stage, the prevailing perception may be underpinned by fear of poor drinking water, accompanied by mistrust of the ability of treatment technology to treat wastewater effluent to meet stringent drinking water quality standards. The implementation of this stage is illustrated in Figure 3-3.

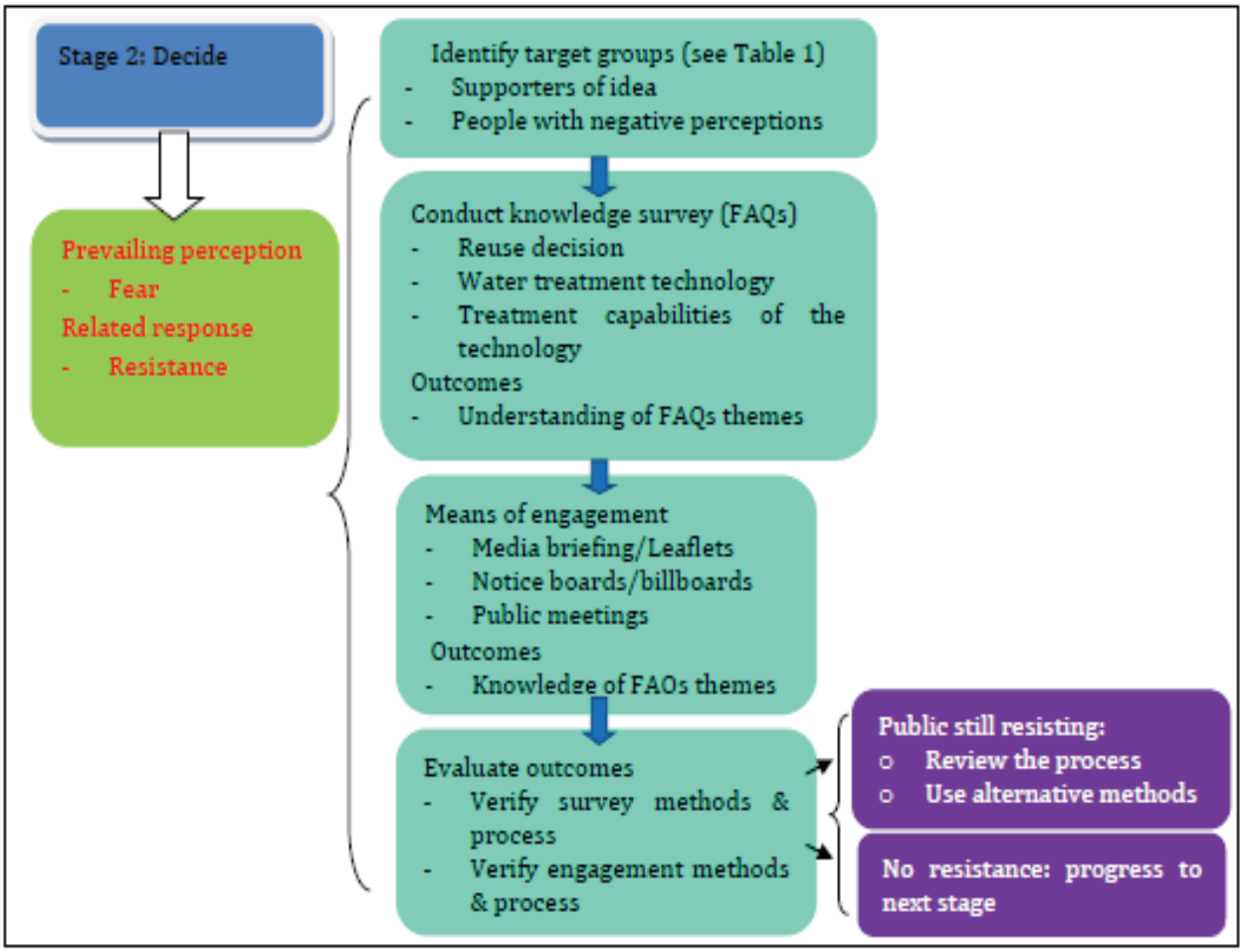


Figure 3-3: Flow chart describing implementation of the Decide stage

To overcome these perceptions, the following steps should be followed:

3.2.2.1 Survey of knowledge required

The survey for this stage is intended to capture public (target groups') knowledge of the rationale for the reuse decision. To capture this knowledge, the following steps should be followed:

- Decide on the target group
  - Identify new target group(s) or use the same groups as in stage 1. Note that new target group(s) should be identified using same procedure as outlined in stage 1.

Note: Priority target group(s) for this stage can be NGOs and CSOs, media, politicians, high profile personalities and celebrities.

- Conduct a survey using FAQs (Table 3-2)
  - Use FAQs to ask questions pertaining to knowledge of the rationale for deciding on reuse and on the treatment technology;
  - Use FAQs to ask questions pertaining to the treatment process used to meet drinking water quality standards.

Table 3-2: Stage 2 Frequently Asked Questions (FAQs)

Themes	FAQs
Reuse decision	✓ What is the basis for deciding on water reclamation compared to other options? ✓ What process was followed to arrive at such a decision? ✓ How was the water treatment technology selected?
Treatment and standards for drinking water	✓ What technology will treat wastewater to produce water of drinking quality standards? ✓ Can this technology produce water in compliance with quality standards? ✓ Was the public involved, were their questions addressed and opinions considered?

Note: The individual interview is the recommended method for surveying target groups at this stage.

- Develop knowledge dissemination materials
  - Group knowledge gaps identified during the survey into themes and subthemes (as relating to the FAQs)
  - Respond to each FAQ in a sequence suggested in Table 3-2 to create the contents
  - Decide on the type(s) and format of materials (notice board, leaflet, media brief, etc.)

Box 4- Outcomes of public knowledge survey

- ✓ Knowledge requirements of the public
  - Target groups' understanding of reasons for selecting water reclamation as alternative
  - Target groups' understanding of water treatment process and compliance with quality standards
- ✓ Typical materials for knowledge dissemination and uptake (as per themes in Table 3.2)

3.2.2.2 Engage public

The importance of specific issues to groups in the public realm may require focused responses to questions that arise from a municipal decision. The public engagement process to overcome fear and mistrust should be conducted as follows:

- Select or develop public engagement method(s)
  - Obtain the list of public engagement means (from previous stage) or identify those used to announce decision(s)
  - Match identified means to developed materials (according to their themes)

- Select the means of engaging the public that matches the theme and sub-themes (based on ease of conveying information and capturing the attention of the target group)
- Select type of media for engagement and visuals (presentation, factsheet etc.)

o Identify public events and develop appropriate process of engagement

The purpose here is to develop processes and events appropriate to each municipal context to engage target groups productively. The following steps are suggested:

- Identify and list events typically occurring in the area/context;
- Relate the selected means of engagement to each of the knowledge dissemination materials themes and sub-themes;
- Assign event(s) to each of the selected mean(s) of engagement;
- Develop a process of engagement to occur during the event (schedule and sequence of events) and in the media

o ***Engage the public (target groups)*** – engagement will depend on the means selected

- Notify target groups (using available means e.g. billboard, notice board, leaflet etc.)
- Design events that allow for questions, responses and the mediation of learning
- Convene the meeting or conduct the interviews (as per schedule developed above)

Box 5 - Outcomes of public engagement

✓ Means of public engagement related to reuse decision stage knowledge themes
✓ Process for engaging public
  - Individual interviews for people with negative perceptions and focus group discussion for supporters
✓ Events relating to knowledge themes (rationale for reuse decision and treatment technology)

Note: events required for this stage can be (but are not limited to) public meetings, discussion forums, and school visits. High profile personalities or celebrities can be used to demonstrate positive attitudes during public gatherings, to assist in engendering confidence in the municipality's technical expertise to the broader public. The schedule of events will include a program outlining sequentially how the engagement will take place, timing, the sequence of interventions, etc.

3.2.2.3 Evaluation of outcomes

Having completed the knowledge survey and engaged the public regarding the reuse decision, an evaluation of the outcomes is required to ensure that the public has acquired the relevant knowledge that will shift their perceptions as required. This evaluation should be undertaken in conjunction with support groups by conducting a short survey of the target group(s) using the same FAQs and methods applied during the knowledge survey step.

- Consider the target groups (that were previously surveyed and engaged)
- Conduct the survey using the individual interview as a method
- Analyse the outcomes of the survey (to provide an indication of shift in perception)

Box 6 - Results of the evaluation of outcomes

- ✓ Knowledge acquired
  - Rationale for reuse decision
  - Technology choice and experience from other areas
  - Treatment process efficiency and compliance with drinking water quality standards
- ✓ Appropriateness and adequacy of survey methods and public engagement means
- ✓ Change of perception
  - Status quo of public perception (have fears and mistrust been overcome?)

Notes:

- ❖ Municipal officials responsible for water services and community liaison and education are well placed to engage the public at this stage.
- ❖ Different groups may require different information or a focus on particular aspects, which may be assessed from the outcomes of the survey.
- ❖ The survey of knowledge requirements and assessment of target groups will ensure that municipal initiatives for engaging the broader public or target groups will be appropriate for the context
- ❖ Moving to the next stage is subject to the evaluation of outcomes. In case of negative outcomes, a review of the entire process by cross-checking each step is recommended. Acceptable outcomes for this stage include:
  - Public understanding of the reuse decision, technology choice and awareness of the experience of other areas where water reclamation is operational; understanding also of water treatment processes and water quality compliance requirements
  - Change of perception from fear to confidence.

- ❖ Outcomes are evaluated by:
  - Reconvening the survey by asking the same questions used initially (see FAQs) and checking people's attitudes
  - Checking people's attitudes by evaluating their responses to the questions and establishing whether any change in perception has occurred. Positive change is registered when the individual interviewed evinces an informed acceptance of issues that were a concern before s/he was engaged.

3.2.3 Stage 3: Implement

The implementation stage entails putting into effect the decision to introduce water reclamation. This stage involves the physical construction of the plant and media coverage of this to address public concerns. The public is and will remain concerned about the safety of reclaimed water. They will be interested in knowing more about the capability of technology to treat wastewater effluent to meet drinking water quality standards. The key steps in this stage are outlined in Figure 3-4.

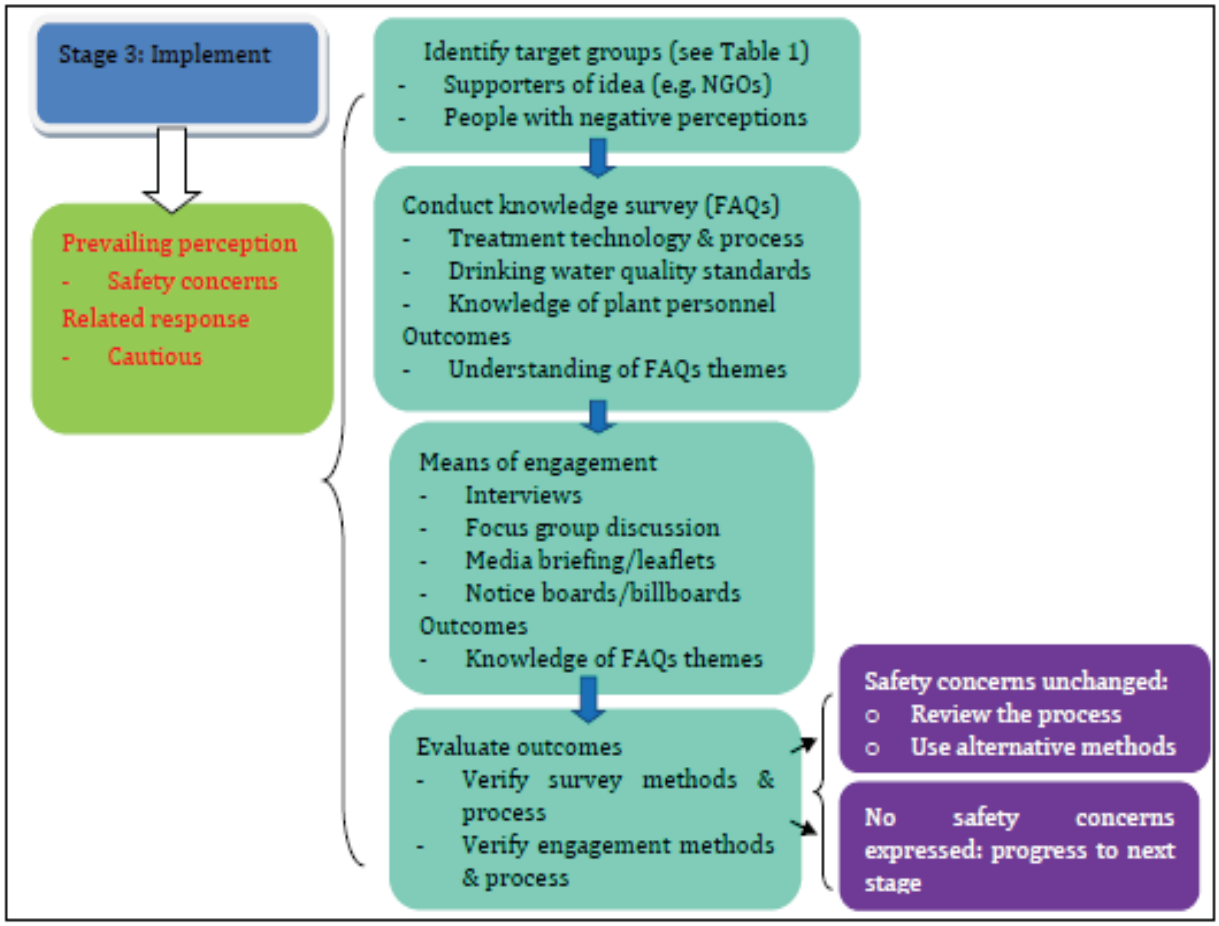


Figure 3-4: Flow chart describing implementation of the Implement stage

In addressing safety concerns, this guideline suggests the following steps:

3.2.3.1 Survey of knowledge required

The public knowledge survey for this stage is intended to capture public (target groups') knowledge of water treatment technology and whether the water produced will be of the required standard for potable purposes. This concern should be addressed as follows:

- Decide on the target group
  - Identify new target group(s) or use groups from previous stages. Should new target group(s) be considered, their identification should follow the same procedure as outlined in stage 1.

Note: since safety concerns about the quality of drinking water is the key issue at this stage, the public would like to know more about how the issue will be addressed. Therefore, priority target group(s) for this stage should be NGOs and CSOs, media, politicians, high profile personalities, celebrities, support groups and members of the public who are negatively disposed.

- Conduct a survey using FAQs (Table 3-3)
  - Use FAQs to ask questions pertaining to knowledge of treatment technology and water quality standards;
  - Use FAQs to ask questions pertaining to the treatment process used to meet drinking water quality standards.

Table 3-3: Stage 3 Frequently Asked Questions (FAQs)[6]

Themes	FAQs
Treatment technology and process	✓ How many processes or stages will be used to treat water?
Drinking water quality standards	✓ What safety measures are in place to ensure that water will meet quality standards?
Capability of the management and operational staff to operate and maintain the plant	✓ Are plant operators sufficiently skilled and knowledgeable to run the plant?

- Develop knowledge dissemination materials
  - Group knowledge gaps into themes and subthemes (as related to FAQs)
  - Respond to each FAQ in a sequence suggested in Table 3-3 to create contents
  - Decide on the type(s) and format of materials (e.g. poster, presentation, notice, etc.)

Box 7 - Outcomes of public knowledge survey

- ✓ Knowledge requirements of the public
  - Target groups' understanding of types of water treatment technology
  - Target groups' understanding of drinking water quality standards
  - Target groups' views of operators' capacity to operate and maintain the plant
- ✓ Typical materials for knowledge dissemination and uptake (as per themes in Table 3-3)

3.2.3.2 Public Engagement

Engagement activity at this stage is intended to deal with target groups capable of spreading resistance. Because safety is the main concern, there is a need to ensure that the public is engaged constructively by using appropriate mechanisms to strengthen their knowledge, hence shifting their negative or reactive attitude towards a more progressive one. The engagement process should be undertaken as follows:

- Select or develop public engagement method(s)
  - Obtain the list of public engagement means from previous stage or identify those used when dealing with public resistance in the area
  - Match identified means of engagement to developed materials (according to their themes from Table 3-3)
  - Select the means of engaging the public that matches the theme and sub-themes (based on ease of conveying information and capturing the attention of the target groups)
  - Select type of media for engagement and visuals (presentation, factsheet etc.).

- Identify public events and develop appropriate process of engagement

The purpose here is to develop processes and events appropriate to each municipal context in order to engage target groups productively. The following steps are suggested:

- Identify and list events typically used to deal with public resistance
- Relate the selected means of engagement to each of the knowledge dissemination materials themes and sub-themes (Table 3-3)

[6] Although the public may not have sufficient knowledge of the themes in this table, water institutions should provide responses to these questions by explaining clearly how water is treated, what are the quality parameters and capabilities, and the level of expertise of plant personnel. This will enable them to overcome public concerns about the safety of drinking water. Typical responses are provided in Appendix 2.

- Assign event(s) to each of the selected mean(s) of engagement
- Develop a process of engagement to occur during the event (schedule and sequence of events) and in the media.

- ***Engage the public (target groups)*** – engagement will depend on the means selected
  - Notify priority target groups (by billboard, notice board, leaflet etc.)
  - Design events that allow for questions, responses and the mediation of learning
  - Convene the meeting or conduct the interviews (as per schedule developed above).

Box 8 - Outcomes of public engagement

- ✓ Means of public engagement are determined by implementation stage knowledge themes
- ✓ Process for engaging public
  - Individual interviews for people with negative perceptions, focus group discussion for supporters, and a briefing for community leaders, media, celebrities and politicians
- ✓ Events relating to knowledge themes (treatment technology and process, drinking water quality standards and plant management capabilities)

Note: priority target groups comprising politicians, celebrities, community leaders, NGOs, CSOs and media can be engaged through briefing sessions and focus group discussion. People who are opposed or resistant to the idea of reclaimed water should be engaged through public meetings, guided site visits, presentations (photo or video show), launch and testimonial (viz. the sharing experience of a site where a similar project has worked well).

3.2.3.3 Evaluation of outcomes

Prior to moving to the next stage, an evaluation of the outcomes is required. This would cover the knowledge acquired and the extent of change in perceptions. The evaluation should be undertaken by support groups (comprising politicians, celebrities, community leaders, NGOs, CSOs and media) through a survey of the target groups with negative perceptions. The survey should be conducted using the very same methods and FAQs that were used for the knowledge survey step.

- Consider the target groups that were previously surveyed and engaged
- Conduct a survey using individual interviews as the method (See FAQs in Table 3-3)
- Analyse the outcomes of the survey (to provide an indication of shift in perception) by comparing respondents' current attitudes to the ones evinced during the previous survey.

Box 9 - Outcomes of the evaluation

- ✓ Knowledge acquired
  - Treatment technology and processes for purifying wastewater effluent into drinking water
  - Safety measures to ensure drinking water quality standards
  - Technical capabilities of staff to operate and manage the plant
- ✓ Public engagement means
  - Interviews and focus group discussions have produced expected results
- ✓ Change of perception
  - Status of public perception

Notes:

- ❖ Municipal officials responsible for water services and community liaison and education are well placed to engage the public at this stage.
- ❖ Once this stage is completed, and positive outcomes have been recorded, proceeding to the next stage of the guideline is required in order to complete the full cycle.
- ❖ Acceptable outcomes for this stage include:
  - Public understanding of the reuse decision and technology choice, and of the experience from other areas where water reclamation is operational; public knowledge of water treatment processes and water quality compliance requirements.
  - Change of perception from fear to confidence.
- ❖ Outcomes are evaluated by:
  - Reconvening the survey by asking same questions again and checking people's attitudes
  - Checking these attitudes by evaluating responses to the questions and establishing whether a change in perception has occurred. Positive change is registered when the individual interviewed evinces an informed acceptance of issues that were a concern before s/he was engaged.

3.2.4 Stage 4: Monitor

The monitoring stage is intended to reassure the public about the safety of reclaimed water. The prevailing perception to be addressed at this stage is mistrust, arising from the possibility that some water users have little confidence in the municipality's ability to ensure that produced water meets drinking water quality standards.

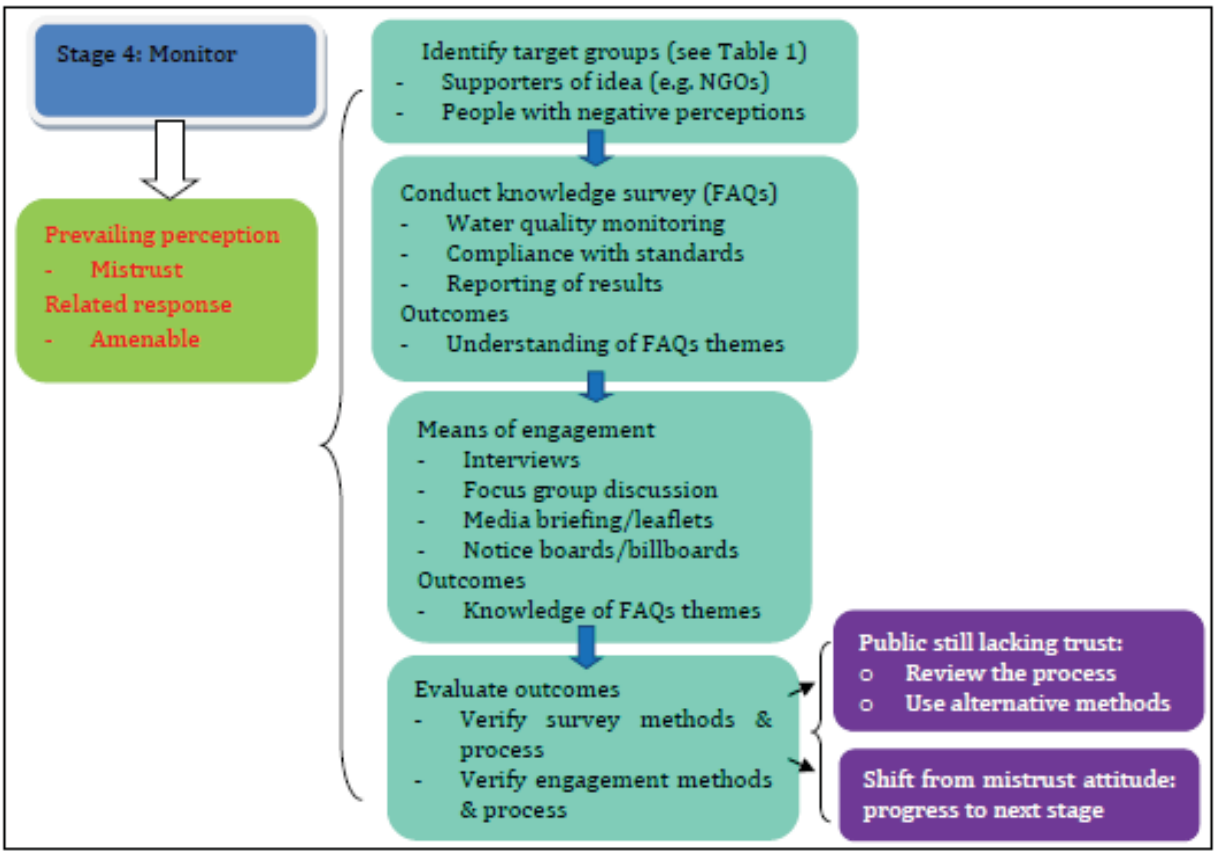


Figure 3-5: Flow chart describing implementation of the Monitor stage

To overcome mistrust, the guideline suggests the following actions:

3.2.4.1 Survey of knowledge required

- Decide on the target group
  - Identify new target group(s) or use groups from previous stages. Should new target group(s) be considered, their identification should follow the same procedure as outlined in Stage 1.

Note: Mistrust is the main concern being addressed at this stage of the institutional process. Priority target group(s) should be NGOs and CSOs, learning institutions, media, politicians and celebrities, community leaders, support groups and members of the public with negative attitudes.

- Conduct a survey using FAQs (Table 3-4)
  - Use FAQs to ask questions pertaining to knowledge of water quality monitoring and compliance with standards.

Table 3-4: Stage 4 Frequently Asked Questions (FAQs)

Step	FAQs
Monitoring	✓ What quality parameters will be monitored and how often? ✓ How often will water quality be monitored and results reported? ✓ Will results be accessible? How and where? ✓ What will be done if the quality of water is not complying with standards? ✓ How will risks of plant failure be addressed?

- Develop knowledge dissemination materials
  - Group knowledge gaps into themes and subthemes (as related to FAQs)
  - Respond to each FAQ in a sequence suggested in Table 3-4 to create contents
  - Decide on the type(s) and format of materials (e.g. leaflet, boards etc.)

Box 10 - Outcomes of public knowledge survey

- ✓ Knowledge requirements of the public
  - Target groups' understanding of monitoring process
  - Target groups' understanding of water quality compliance with standards
- ✓ Typical materials for knowledge dissemination and uptake (as per themes in Table 3-4)

3.2.4.2 Public Engagement

Engagement activity in this stage is intended to deal with target groups that may spread resistance. Because of safety concerns, there is a need to ensure that the public is engaged constructively by using appropriate mechanisms to strengthen their knowledge, thereby shifting their negative perception towards a more progressive one. The engagement process should be undertaken as follows:

- Select or develop public engagement method(s)
  - Obtain the list of public engagement means from the previous stage or identify those typically used when dealing with public resistance in the area

- Match the identified means of engagement to the developed materials (according to their themes from Table 3-4)
- Select the means of engaging the public that matches the theme and sub-themes (based on ease of conveying information and capturing the attention of the target groups)
- Select type of media for engagement and visuals (presentation, factsheet etc.).

- Identify public events and develop an appropriate process of engagement

The purpose here is to develop processes and events appropriate to each municipal context to engage target groups productively. The following steps are suggested:

- Identify and list events typically used to deal with public resistance
- Relate the selected means of engagement to each of the knowledge dissemination materials themes and sub-themes;
- Assign event(s) to each of the selected means of engagement;
- Develop a process of engagement to occur during the event (schedule and sequence of events) and in the media.

- ***Engage the public (target groups)*** – engagement will depend on the means of engagement selected.
- Notify priority target groups (using leaflet, word of mouth, notice boards, etc.)
- Design events that allow for questions, responses and the mediation of learning
- Convene the meetings or conduct the interviews (as per schedule developed above).

Note: Priority target groups comprising politicians, celebrities, community leaders, NGOs, CSOs and people with negative perceptions (or who mistrust water institution officials) should be engaged through public meetings, guided visits at the plant and laboratory, road shows and communication sessions demonstrating verification of water quality results (e.g. Blue Drop).

Box 11 - Outcomes of public engagement

- ✓ Means of public engagement are determined by the monitoring stage knowledge themes
- ✓ Process for engaging the public
  - Individual interviews, road show, guided plant visits and public meetings for people with negative perceptions
  - Focus group discussions for support agents and briefing and communication sessions for community leaders, media, celebrities and politicians.
- ✓ Events are also related to knowledge themes (monitoring and compliance with water quality standards)

3.2.4.3 Evaluation of outcomes

The guideline suggests undertaking an evaluation upon the completion of the two first steps (the knowledge survey and the public engagement process). The evaluation is intended to ensure that target groups have acquired relevant knowledge and have consequently changed their attitude from mistrust to promotion. This evaluation should be done through a survey of the target group with negative perceptions, using the same methods and FAQs as were employed during the knowledge survey step.

The evaluation should be undertaken as follows:

- Consider the target groups (that were previously surveyed and engaged)
- Conduct the survey using the individual interview as the method (See FAQs in Table 3-4)

- Analyse the outcomes of the survey (to provide an indication of shift in perception) by comparing respondents' current attitudes to those shown in the previous survey.

Box 12 - Outcomes of the evaluation

- ✓ Knowledge acquired
  - Water quality monitoring process
  - Water quality results and their significance from a health point of view
  - Backup plan in case of non-compliance with standards.

- ✓ Change of perception
  - Status of target groups' attitude (from mistrust to promotion).

Notes:

- ❖ Municipal officials responsible for water services and community liaison and education are well placed to engage the public at this stage.

- ❖ Acceptable outcomes for this stage include:
  - Public understanding of the reuse decision and technology choice, and exposure to the experience from other areas where water reclamation is operational; public knowledge of water treatment processes and water quality compliance requirements
  - Change of perception from fear to confidence.

- ❖ Outcomes are evaluated by:
  - Reconvening the survey by asking same questions as before and checking people's attitudes
  - Checking these attitudes by evaluating responses to the questions and establishing whether a change in perception has occurred. Positive change is registered when the individual interviewed evinces an informed acceptance of issues that were a concern before s/he was engaged.

CHAPTER 4: CONCLUSION

4.1 SUMMARY

Table 4 1 summarises the guidance for water institutions to develop materials and design learning mediation.

4.2 CONCLUDING REMARKS

This Guideline has been refined to ensure its utility in variable contexts. Municipal water services managers in three different case studies were engaged in interviews that focused on:

- identifying the stage, they have reached
- clarifying challenges that have arisen at this stage
- likely target groups located across their public realm
- the adaptability of steps to local conditions within each stage.

Insights shared from a range of potential models for adaptation within each local context have been accommodated in generic guidance by taking the following local variables into account:

- Norms and dynamics
- Protocol and procedures
- Politics and money: socio-economic and structural influences.

Variables in each context will influence specific applications in respect of:

- Target groups
- Public Participation structures and “typical” stakeholder engagement norms (e.g. EIAs)
- Surveys and Analysis
- Evaluation and procedures for deciding on improvements.

While the Guideline is subject to adaptation in each municipal context, learning from applications elsewhere is also recommended. The replication of scientific and technical findings, and the sharing of knowledge across the sector, are encouraged for the purposes of organisational learning about addressing public resistance and building trust in public institutions. It is therefore recommended that this guideline be tested in a context where water reclamation is a first-choice water augmentation option.

Table 4-1: Guidance for water institutions to develop materials and design learning mediation

Stage 1: Prepare

- Step 1: Water scarcity and risk management - dealing with denial (KR1a)

Public questions	Municipal responses	Materials development (What)	Mediation of learning (How)
Where does water come from, and how is potable water provided?	Water comes from various sources including rain, rivers, lakes, the ocean, underground, springs, snow and fog. Once a source of water is identified, water is captured and conveyed to a plant where it is treated and distributed to consumers.	Posters, flyers, booklets to distribute: - Visually depict context-specific water cycles with local sources, rainfall trends, storage, treatment plants, and distribution networks - Highlight available quantities alongside demand/needs to supply consumers Billboards may update dam levels	Meetings and workshops: Present and explain - Ask people what they already know before conveying information to add to their knowledge/experience. Respond to questions that arise. Explain risks for specific sources.
What is water scarcity?	Water scarcity involves water shortages, water stress or deficits, and water crises.		
How is water scarcity recognised?	Depletion of available water sources, drying veld, dams and rivers, reduction of level of ground water, etc.		
What are the causes of water scarcity?	Water scarcity is caused by inadequate water sources which may be an effect of recurrent drought, climate change, and urbanisation, or by over-exploitation of available resources.	- Posters, flyers, booklets to distribute: - Local threats and risks are emphasised. - Evidence/information included is context specific. - List municipal measures to encourage public conservation. - Detail evidence of water losses related to public water use practices. - List of consequences.	Awareness campaigns: Local features connect to peoples' experience across the public realm. School programmes.
What are the risks to the public when water scarcity occurs?	Water shortages, intermittent water supply, increase in water tariffs, water restrictions.		Incentives to conserve water may be tariff related – include in water bills.
What can or should be done when water scarcity is recognised?	Become water-wise and use water sparingly, fix leaks, apply water-saving devices, reuse water for other purposes including gardening or car washing		Meetings and workshops: - Present and explain – impacts of water leaks, waste and saving. - Motivate public water use practices that may substantially conserve.
How are risks managed during a water scarcity period?	Introducing water restrictions, introducing a moratorium on water use, supplying water intermittently, increasing water tariffs for those who exceed certain limits, fining those who don't comply;		

	introducing awareness campaign to reduce water use.		- Present causes relating to the risks and vulnerabilities of different social groups.
Why should risks be managed in this particular way?	When there is lack of available alternatives or of money to build new infrastructure; when there are limited options and a lack of suitable and sustainable alternatives.	Posters, flyers, booklets to distribute: Translate WSDPs into lay terms.	

- Step 2: Reconciliation study - dealing with doubts (KR1b)

Public questions	Municipal Responses	Materials development	Mediation of learning
What is a water reconciliation study and why it is important?	It is a study initiated to identify, evaluate and prioritise interventions to reconcile the water requirements with the available water resources; to develop a strategy that will be flexible enough to accommodate future changes in actual water use and to integrate augmentation and bulk supply options to achieve optimised overall benefits.	Posters, flyers, booklets to distribute: Translate demand/supply findings of direct interest to local water users: - Local growth trends as demand - Supply source capacities - Local threats and risks.	Meetings and workshops: Present and explain the balance of supply and demand Describe institutional mandates and responsibilities re: water supply. Respond to questions that arise.
What is the meaning of the study outcomes?	Water availability, water use availability vs demand; plan for future water use.		
Is augmentation of water supplies necessary?	Yes, because the availability of water must respond to the demand; if this is not the case, augmentation will be required to ensure continuous supply.	List of augmentation options for investigation, with their: - Suitability to local context - Costs and benefits - Availability.	Meetings and workshops: Present and explain sources of water and availability in relation to demand Present and explain the need for augmenting water and available alternatives.
Are current water sources sufficient to meet demand?	No, because increasing demand and depletion of available resources means that steps have to be taken to ensure a continuous supply to meet current and future water requirements.		
What are the benefits of alternative solutions?	Addressing the adverse impacts of exploiting finite water resources for human development are to be viewed as the benefits of alternative solutions.		

Who should be involved in this study?	The study involves many stakeholders including members of the public and water institutions.	Depict tiers of agency and influence: - Institutions and stakeholder roles that may be unfamiliar to the public; - Equity and cultural specifics.	Specific target groups may require explanations tailored to respond to issues pertinent to their particular context. - Respond to questions they raise.
Can the public have a say in this study?	No, because the study concerns specialised water institutions.		

- Step 3: Feasibility study - dealing with doubts (KR1c)

Public questions	Municipal Responses	Materials development	Mediation of learning
What does a feasibility study entail?	A feasibility study is undertaken to provide stakeholders with information on existing conditions and to assess viable alternatives that will ensure a potable water supply to the public.	Posters, flyers, booklets to display and distribute.	Media briefing – announce, update and respond to letters or questions.
How important are the outcomes of this study to the public?	Outcomes provide an indication of viable water augmentation options that can be used to overcome water scarcity and respond to demand.		
How should these outcomes be communicated to the public?	Communication is dependent on the local context, as each area may have its own methods.	Notice boards, water bills and pamphlets.	In general, outcomes may be communicated through media, public meetings, etc.
How do we know that water is available?	Water availability is informed by a reconciliation study. A feasibility study determines suitable options.		
What are feasible water scenarios?	Feasible water scenarios vary from one area to another. Outcomes of the feasibility study provide context-based information on feasible options.		

Stage 2: Decide - dealing with mistrust and fear (KR2)

Public questions	Response	Materials development	Mediation of learning
What is the basis for deciding on water reclamation as opposed to other options?	Deciding on water reclamation is based on the outcomes of the reconciliation and feasibility studies. Alternative options may not be available or sufficient to meet the demand.	Posters, flyers, booklets - display and distribute. Brochure that refers to key criteria relating to local context.	Meetings and workshops: - Present and explain reclamation - Compare it to other options. Describe reclamation that is tried and tested; Respond to questions that arise.
What process should be followed to arrive at such a decision?	Water services professionals analyse findings from water reconciliation and feasibility studies. A decision is reached after comparing the suitability of options in context.		
Can the public be involved and their opinions considered?	Yes, Public opinion may be considered if it contributes to addressing challenges, after a presentation of reasons for the decision.		
What option(s) is/are feasible in context?	The feasibility of options is context-based, so choices are dictated by particular conditions in the area (based on the outcomes of the reconciliation and feasibility studies).	Notice boards, water bills and pamphlets.	Meetings and workshops: - Present and explain treatment - Compare it to other options. Media briefing – announce, update and respond to letters or questions - Translate scientific health standards of quality for consumption - Convey regulatory mechanisms and standards applied.
What treatment technologies can achieve drinking water quality standards?	There are many water treatment technologies; the most commonly used in water reclamation are reverse osmosis and membrane filtration.	Posters, flyers, booklets - display and distribute: - Simplify and explain science and technical terminologies	
How is the water treatment technology to be selected?	Water treatment technology is selected according to one's technological ability to treat and deliver water that meets drinking water quality standards, is cost effective and can be operated and maintained with relative ease.		
Where has it worked well? What does water treatment entail?	Treatment of effluent for drinking purposes has worked for years in many countries including Namibia, Singapore and some States in the USA. It	Illustrated examples of successful cases: Beaufort West, Namibia	Meetings and workshops: - Convey global experience

	has also worked well in Beaufort West (South Africa) for the past 4 years. The treatment technology is a multi-barriers process that entails various procedures to remove visible and invisible pollutants from the inlet to the final water.		- Highlight relevance of Beaufort West/Namibian experience and lessons for the local context - Explain and update the science and technologies applied.
What processes will be used to treat wastewater effluent to produce water that meet drinking quality standards?	The processes may vary from one technology to another. The most common used include: - Ultra filtration, reverse osmosis and ultra-violet - Membrane filtration, reverse osmosis, ultra violet or advanced oxidation process - Sand filtration – ultra filtration – reverse osmosis - ultra violet or advanced oxidation process and chlorination - Membrane filtration – reverse osmosis – buffer blending – conventional treatment process (comprising coagulation, flocculation, settling, filtration, chlorination) - Membrane filtration – reverse osmosis – ultra violet or advanced oxidation process – ultra filtration – ultra violet – granular activated carbon – chlorination - Powder activated carbon – ozonation, clarification and filtration, dissolved air floatation, sand filtration – advanced oxidation process – biologically activated carbon – granular activated carbon – ultra filtration – chlorination	Posters, flyers, booklets - display and distribute: - Simplify and explain science and technical terminologies	
Can this technology produce water in compliance with quality standards?	Yes, if adequately implemented, operated and maintained.	Translate Blue Drop certification, display and distribute	Demonstrate the meaning of Blue Drop and its guarantee of safety of water (based on scoring system).

Do the cost implications of treatment affect consumer tariffs?	Yes, as it depends on the cost of treatment and other requirements including operation and maintenance.	Explain water costing rules	Water tariff according to consumption.

Stage 3: Implement - dealing with safety concerns (KR3)

Public questions	Response	Materials development	Mediation of learning
What health risks are associated with drinking reclaimed water?	So far, no health risks associated with drinking potable reclaimed water have been reported.	Posters, flyers, booklets - display and distribute: - Simplify and explain science and technical terminologies.	Demonstration: On-site visits to the plant and laboratory.
How many processes will be used to treat water?	The number of processes depends on the type and nature of the treatment technology used. In general, the number of processes may vary between 4 and 13 (see Stage 2 above for details).		
What are drinking water quality standards?	The main quality standards are those requested by SANS and WHO. Details in appendix 3, below.		
What standards are applied, and how is compliance ensured?	In South Africa, SANS 241 standards are used (See Appendix 3). SANS 241 lists the determinants and corresponding limits that need to be measured in order to determine that drinking water is safe for us to drink.		
What safety measures are in place to ensure that the produced water will meet safety standards?	Regular monitoring and testing of water quality, test results that are confirmed by local and private labs. Compliance with standards is checked by comparing test results with SANS 241 standards.	Notice boards, water bills and pamphlets.	

How does the treatment process ensure compliance?	Each treatment process is designed to remove certain types of pollutants, and involves testing the water quality to ensure that the pollutants are removed before moving to the next process. Finally, water is tested for all pollutants and recommended limits listed in Appendixes 3 and 4 for compliance.		
Are the plant operators sufficiently knowledgeable to run the plant adequately?	Requirements for plant operators are that they are knowledgeable about water treatment processes. Operators are trained by professionals to acquire the skills and knowledge required to operate a new technology when it is introduced in a plant.	DWS plant operator classifications	On-site visits to plant – direct interaction. Demonstration of plant operation.

Stage 4: Monitor - dealing with mistrust (KR4)

Knowledge questions	Response	Materials development	Mediation of learning
How will water quality be monitored?	Water quality determinants that impact on human health are typically monitored using a risk-based monitoring program, which determines an acceptable amount of end user health implications over a given period of time (Swartz et al., 2015).	Posters, flyers, booklets - display and distribute: - Simplify and explain science and technical terminologies.	Presentation of water quality determinants and their impacts on human health
What quality determinants will be monitored and how often?	See Appendix 3, below, for details. In normal circumstances, it is recommended that the water quality be monitored daily.	Posters, flyers and booklets Municipal website DWS website (Blue Drop)	Guided plant visits and presentations
What process will be used to monitor plant operations and compliance with standards?	Samples are collected and tested for quality determinants outlined in Appendix 3. If parameters tested are within the limits, water quality is accepted; if they are above limits, water is not distributed but declared unfit for drinking purposes and re-treated.	Municipal website Water bill Municipal notice board	Guided laboratory visits and demonstrations
How will the public know that the water produced meets water quality and health standards?	Water quality results are published and accessible on the municipal website. On request, results can be presented to the public.	Municipal website DWS website (Blue Drop) Municipal notice board	Demonstration on how to read and interpret water quality results
What are the implications of drinking reclaimed water?	So far, there are no recorded implications of drinking reclaimed water. In Namibia, people have been drinking such water for over 45 years and no risk has been reported.	Notes from Namibia Extract from Namibia water quality reports	Presentations (video, photos) Testimony from Namibians (video or audio recorded)
What will be done if the quality of water is not complying with standards?	Water will be declared unfit for drinking purposes, hence not distributed. Such water will be sent back to a buffer tank and treated again.	Water quality standards compliance Classification of drinking water	Presentation of essential water quality parameters and visible signs
How will risks pertaining to plant failure be addressed?	Water treatment plants have back-up plans to address failure. In many cases, if a plant fails, consumers are advised (depending on the quality of the final water) to boil water, use bleach, or drink	Plant management plan Water quality monitoring plan	Guided plant visits

	bottled water and use the municipal water for non-potable purposes. In many cases, the water supply is discontinued until the problem is addressed.		
What plans are in place to back up plant operations and address breakdowns?	In big towns, the water network is interlinked but this may not be the case for smaller towns. Depending on the type of breakdowns, back-up plans can include by-passing, use of basic treatment, shut down of plant or use only conventional water sources, etc.	Plant maintenance plan	

USEFUL READINGS

Beck, S. 2009. Between disgust and trust: state of social science research on the implementation and acceptance of water and wastewater reclamation and reuse (WWT&R). Available at: http://www.iwrm-smart.org.

Boucher, M., Jackson, T., Mendoza, I. & Snyda, K. 2012. Public perception of Windhoek's drinking water and its sustainable future. Unpublished BSc Thesis, Worcester Polytechnic Institute.

Cain, C.R. 2011. Analysis of direct potable water reuse acceptance in the United States: obstacles and opportunities. Baltimore MD: Johns Hopkins Bloomberg School of Public Health.

Du Pisani, P.L. 2005. Direct reclamation of potable water at Windhoek's Goreangab reclamation plant. In S. J. Khan, M. H. Muston & A. I. Schaefer (eds.), *Proceedings from Integrated Concepts in Water Recycling.* Wollongong: Wollongong University. 193-202.

eThekwini Municipality. 2002. *Learning what works: a guide to the Durban Metro water services' award-winning sewage disposal education campaign*. Durban: Education and Public Liaison Division, Wastewater Management Department.

Hay, E.R., Riemann, K., van Zyl, G. & Thompson, I. 2011. Ensuring water supply for all towns and villages in the Eastern Cape and Western Cape Provinces of South Africa. *Water SA* 38(3): International Conference on Groundwater Special Edition 2012. http://dx.doi.org/10.4314/wsa.v38i3.9

Kemp, B., Randle, M.J., Hurlimann, A. & Dolnicar, S. 2012. Community acceptance of recycled water: can we inoculate the public against scare campaigns? *Journal of Public Affairs* 12(4): 337-346.

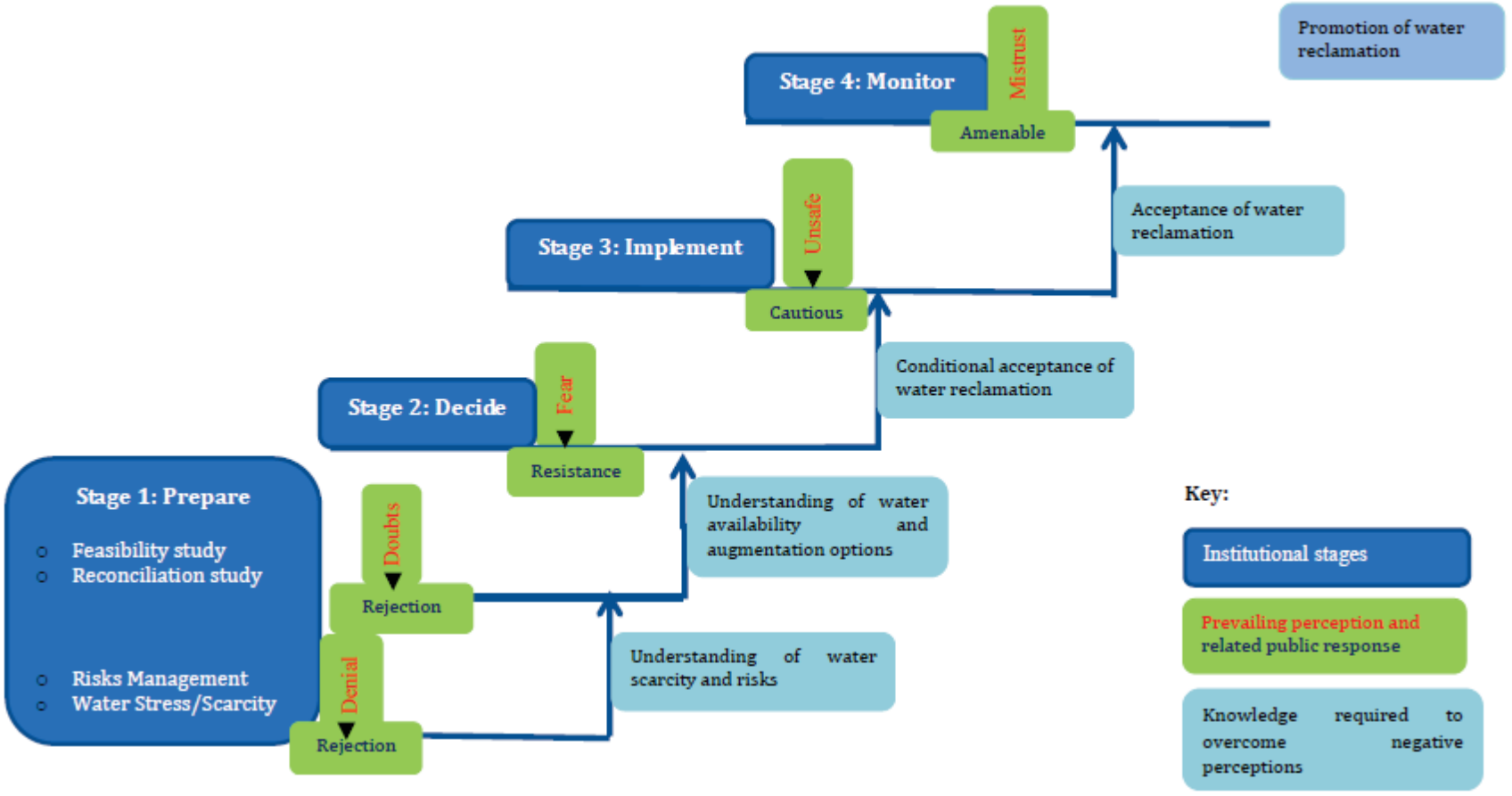
Menge, J. n.d. *Treatment of wastewater for re-use in the drinking water system of Windhoek*. Namibia. 14pp. http://www.ewisa.co.za/literature/files/339%20Menge.pdf

South Africa. Department of Water Affairs. 2013. *National water resource strategy*. 2nd ed. Pretoria: Government printer.

Western Cape Integrated Water Resources Management Action Plan. 2011. http://www.westerncape.gov.za/general-publication/provincial-integrated-water-resource-management-plan.

APPENDICES

Appendix 1: Overview of the link between the institutional process and the continuum of acceptance



Appendix 2: Public awareness materials – typical responses to frequent public questions

This guide is primarily intended for water authorities, to address public knowledge deficits and enable the public to understand water reclamation and its benefits. This will usually be achieved through a public engagement process using various engagement means and tools. However, some members of the public may decide not to attend public gatherings while expressing the need to access information and gain knowledge. Therefore, water institutions should clearly and unambiguously respond to typical questions from the public. This will enable the latter to gain knowledge which is likely to shift their perception. It should be noted that responses to the questions may vary from one area to another, so local contexts and conditions should be taken into consideration. Some responses to questions may require illustration (including facts, figures, action etc.) to ensure better understanding.

Stage 1: prepare

- Step 1: Water scarcity and risk management - dealing with denial (KR1a)

Knowledge questions	Response
Where does water come from, and how is potable water provided?	Water comes from various sources including rain, rivers, lakes, the ocean, underground, springs, snow and fog. Once a source of water is identified, water is captured and conveyed to a plant where it is treated and distributed to consumers.
What is water scarcity?	Water scarcity involves water shortages, water stress or deficits, and water crises.
How is water scarcity recognised?	Depletion of available water sources, drying veld, dams and rivers, reduction of level of ground water, etc.
What are the causes of water scarcity?	Water scarcity is caused by inadequate water sources which may be an effect of recurrent drought, climate change, urbanisation or over-exploitation of available resources.
What are the main risks to the public when water scarcity occurs?	Water shortages, intermittent water supply, increase in water tariffs, water restrictions.
What can or should be done when water scarcity is recognised?	Become water-wise and use water sparingly, fix leaks, apply water-saving devices, reuse water for other purposes including gardening or car washing
How are risks managed during a water scarcity period?	Introducing water restrictions, introducing a moratorium on water use, supplying water intermittently, increasing water tariffs for those who exceed certain limits, fining those who don't comply; introducing an awareness campaign to reduce water use
Why should risks be managed in this particular way?	When there is lack of available alternatives or money to build new infrastructure; when there are limited options and a lack of suitable and sustainable alternatives.

- Step 2: Reconciliation study - dealing with doubts (KR1b)

Knowledge questions	Response
What is a water reconciliation study and why it is important?	It is a study initiated to identify, evaluate and prioritise interventions to reconcile the water requirements with the available water resources; to develop a strategy that will be flexible enough to accommodate future changes in actual water use and to integrate augmentation and bulk supply options to achieve optimised overall benefits.
What is the meaning of the study outcomes?	Water availability, water use availability vs demand; plan for future water use.
Is augmentation of water supplies necessary?	Yes, because the availability of water must respond to the demand; if this is not the case, augmentation will be required to ensure continuous supply.
Are current water sources sufficient to meet demand?	No, because increasing demand and depletion of available resources means that steps have to be taken to ensure a continuous supply to meet current and future water requirements.
What are the benefits of alternative solutions?	Addressing the adverse impacts of exploiting finite water resources for human development are to be viewed as the benefits of alternative solutions.
Who should be involved in this study?	The study involves many stakeholders including members of the public and water institutions.
Can the public have a say in this study?	No, because the study concerns specialised water institutions.

- Step 3: Feasibility study - dealing with doubts (KR1c)

What does a feasibility study entail?	A feasibility study is undertaken to provide stakeholders with information on existing conditions and to assess viable alternatives that will ensure a potable water supply to the public.
How important are the outcomes of this study to the public?	Outcomes provide an indication of the viable water augmentation options that can be used to overcome water scarcity and respond to demand.

How should these outcomes be communicated to the public?	Communication is dependent on the local context as each area may have its own methods. In general, outcomes may be communicated through media, public meetings, notice boards, water bills and pamphlets.
How do we know that water is available?	Water availability is informed by a reconciliation study. A feasibility study determines suitable option.
What are feasible water scenarios?	Feasible water scenarios vary from one area to another. Outcomes of the feasibility study provide context-based information on feasible options.

Stage 2: Decide - dealing with mistrust and fear (KR2)

Knowledge questions	Response
What is the basis for deciding on water reclamation as opposed to other options?	Deciding on water reclamation is based on the outcomes of the reconciliation and feasibility studies. Alternative options may not be available or sufficient to meet demand.
What process should be followed to arrive at such a decision?	Water services professionals analyse findings from water reconciliation and feasibility studies. A decision is reached after comparing the suitability of options in the context.
Can the public be involved and their opinions considered?	Yes, Public opinion may be considered if it contributes to addressing challenges, after a presentation of reasons for the decision.
What option(s) is/are feasible in context?	The feasibility of options is context-based, so choices are dictated by particular conditions in the area (based on the outcomes of the reconciliation and feasibility studies).
What treatment technologies can be used to achieve drinking water quality standards?	There are many water treatment technologies; the most commonly used in water reclamation are reverse osmosis and membrane filtration.
How is the water treatment technology to be selected?	Water treatment technology is selected according to one's technological ability to treat and deliver water that meets drinking water quality standards, is cost effectiveness and can be operated and maintained with relative ease.
Where has it worked well? What does water treatment entail?	Treatment of treated effluent for drinking purposes has worked for years in many countries including Namibia, Singapore and some States in the USA. It has also worked well in Beaufort West (South Africa) for the past 4 years. The treatment technology is a multi-barriers process that entails various procedures to remove visible and invisible pollutants from the inlet to the final water.
What processes will be used to treat wastewater effluent to produce water that meets drinking quality standards?	The processes may vary from one technology to another. The most common used include: - Ultra filtration, reverse osmosis and ultra-violet - Membrane filtration, reverse osmosis, ultra violet or advanced oxidation process - Sand filtration – ultra filtration – reverse osmosis - ultra violet or advanced oxidation process and chlorination

	- Membrane filtration – reverse osmosis – buffer blending – conventional treatment process (comprising coagulation, flocculation, settling, filtration, chlorination) - Membrane filtration – reverse osmosis – ultra violet or advanced oxidation process – ultra filtration – ultra violet – granular activated carbon – chlorination - Powder activated carbon – ozonation, clarification and filtration, dissolved air floatation, sand filtration – advanced oxidation process – biologically activated carbon – granular activated carbon – ultra filtration – chlorination
Can this technology produce water in compliance with quality standards?	Yes, if adequately implemented, operated and maintained.
Do the cost implications of treatment affect consumer tariffs?	Yes, as it depends on the cost of treatment and other requirements including operation and maintenance.

Stage 3: Implement - dealing with unsafety (KR3)

Knowledge questions	Response
What health risks are associated with drinking reclaimed water?	So far there no health risks associated with drinking potable reclaimed water have been reported.
How many processes will be used to treat water?	The number of processes depends on the type and nature of the treatment technology used. In general, the number of processes may vary between 4 and 13 (see Stage 2, above, for details).
What are drinking water quality standards?	The main quality standards are those requested by SANS and WHO. Details in Appendix 3, below.
What standards are applied, and how is compliance ensured?	In South Africa, SANS 241 standards are used (see Appendix 3). SANS 241 lists the determinants and corresponding limits that need to be measured in order to determine that the quality of drinking water is safe for us to drink.
What safety measures are in place to ensure that the produced water will meet safety standards?	Regular monitoring and testing of water quality, tests results that are confirmed by local and private labs. Compliance with standards is checked by comparing test results with SANS 241 standards.
How does the treatment process ensure compliance?	Each treatment process is designed to remove certain types of pollutants, and involves testing the water quality to ensure that the pollutants are removed before moving to the next process. Finally, water is tested for all pollutants and recommended limits, as listed in Appendixes 3 and 4 for compliance.
Are the plant operators sufficiently knowledgeable to run the plant adequately?	Requirements for plant operators are that they are knowledgeable about water treatment processes. Operators are trained by professionals to acquire the skills and knowledge required to operate a new technology when it is introduced in a plant.

Stage 4: Monitor - dealing with mistrust (KR4)

Knowledge questions	Response
How will water quality be monitored?	Water quality determinants that impact on human health are typically monitored using a risk-based monitoring program, which determines an acceptable amount of end user health implications over a given period of time (Swartz et al., 2015).
What quality determinants will be monitored and how often?	See Appendix 3, below, for details. In normal circumstances, it is recommended that the quality of water be monitored daily.
What process will be used to monitor plant operations and compliance with standards?	Samples are collected and tested for quality determinants outlined in Appendix 3. If parameters tested are within the limits, water quality is accepted; if they are above limits, water is not distributed but declared unfit for drinking purposes and re-treated.
How will the public know that the water produced meets water quality and health standards?	Water quality results are published and accessible on the municipal website. On request, results can be presented to the public.
What are the implications of drinking reclaimed water?	So far, there are no recorded implications of drinking reclaimed water. In Namibia, people have been drinking such water for over 45 years and no risk has been reported.
What will be done if the quality of water is not complying with standards?	Water will be declared unfit for drinking purposes, hence not distributed. Such water will be sent back to a buffer tank and allowed to be treated again.
How will risks pertaining to plant failure be addressed?	Water treatment plants have back-up plans to address failure. In many cases, if a plant fails, consumers are advised (depending on the quality of the final water) to boil water, use bleach, or drink bottled water and use the municipal water for non-potable purposes. In many cases, the water supply is discontinued until the problem is addressed.
What plans are in place to back up plant operations and address breakdowns?	In big towns, the water network is interlinked but this may not be the case for smaller towns. Depending on the type of breakdowns, back-up plans can include by-passing, use of basic treatment, shut down of plant or use only conventional water sources, etc.

Appendix 3: SANS 241 - Drinking water quality standards (adapted from 2015 Blue drop)

Category	Determinants	Standard limit	Risk
Microbiological	Escherichia coli (count/100ml)	0	Acute health
	Faecal coliforms (count/100ml)	0	Acute health
Protozoan	Cryptosporidium (count/100ml)	0	Acute health
	Giardia (count/100ml)	0	Acute health
	Total coliforms (count/100ml)	<10	Operational
	Heterotrophic plate count (count/1ml)	<1000	Operational
Physical and aesthetic	Free Chlorine (mg/l)	≤5	Chronic health
	Monochloramine (mg/l)	≤3	Chronic health
	Colour (Pt-Co)	<15	Aesthetic
	Conductivity at 25°C (mS/m)	≤170	Aesthetic
	Total Dissolved Solids (mg/l)	≤1200	Aesthetic
	Turbidity (NTU)	≤1 to ≤5	Operational & aesthetic
	pH at 25°C	≤5 to ≤9.7	Operational
Macro-chemical	Ammonia as N (mg/l)	≤1.5	Aesthetic
	Chloride as Cl^- (mg/l)	≤300	Aesthetic
	Fluoride as F^- (mg/l)	≤1.5	Chronic health
	Nitrate as N (mg/l)	≤11	Acute health
	Nitrite as N (mg/l)	≤0.9	Acute health
	Nitrite-nitrate ratio	≤1	Acute health
	Sodium as Na (mg/l)	≤200	Aesthetic
	Sulfate as SO_4^{2-} (mg/l)	≤500 to ≤250	Acute health & aesthetic
	Zinc as Zn (mg/l)	≤5	Aesthetic
Micro-chemical	Aluminium as Al (µg/l)	≤300	Operational
	Antimony as Sb (µg/l)	≤20	Chronic health
	Arsenic as As (µg/l)	≤10	Chronic health
	Barium as Ba (µg/l)	≤700	Chronic health
	Boron as B (µg/l)	≤2400	Chronic health
	Cadmium as Cd (µg/l)	≤3	Chronic health
	Chromium (total) as Cr (µg/l)	≤50	Chronic health
	Copper as Cu (µg/l)	≤2000	Chronic health
	Cyanide (recoverable) as CN^- (µg/l)	≤200	Acute health
	Iron as Fe (µg/l)	≤2000 to ≤300	Chronic health & aesthetic
	Lead as Pb (µg/l)	≤10	Chronic health
	Manganese as Mn (µg/l)	≤400 to ≤100	Chronic health & aesthetic
	Mercury as Hg (µg/l)	≤6	Chronic health
	Nickel as Ni (µg/l)	≤70	Chronic health
	Selenium as Se (µg/l)	≤40	Chronic health
	Uranium as U (µg/l)	≤30	Chronic health
Chemical - organic	Total organic carbon as C (µg/l)	≤10	Chronic health
	Chloroform (µg/l)	≤100	Chronic health
	Bromoform (µg/l)	≤100	Chronic health
	Dibromochloromethane (µg/l)	≤100	Chronic health
	Bromodichloromethane (µg/l)	≤60	Chronic health

	Trihalomethane ratio (μg/l)	≤1	Chronic health
	Total Microcystin as LR (μg/l)	≤1	Chronic health
	Phenols (μg/l)	≤10	Aesthetic

Note: Drinking Water Quality Standards list the determinants and corresponding limits that need to be measured in order to determine that the quality of drinking water is safe for us to drink.

Appendix 4: Summary of chemical determinants contained in DWA Water Quality (Swartz et al., 2015)

Parameter	Source	DWA WQG for Domestic Use (1996)		Rand Water
		Target in mg/L unless otherwise stated	max mg/L	Target (max) mg/L unless stated
Al	Earth's crust (geology) dissolves in acidic water	0.15	0.5	
Ammonia	Agricultural runoff	1.0	2.0	
Antimony(Sb)				50 (100) µg
As	Industrial pollution and geology	0.1	2.0 ?	50 (100) µg
Cd	Geology and industrial pollution	5 µg/L	10 µg/L	5 (10) µg
Chloride		100	200	100 (200)
Cr	Industrial pollution	0.05	1.0	50 (100) µg
Cu	Industrial pollution	1.0	3.0	0.5 (1.0)
DOC	Natural humics, synthetic organics. Agri pesticides lead to formation of THMs	5.0	10.0	5 (10)
F	Geology, industrial pollution	1.0	1.5	1.0 (1.5)
Fe	Geology, mining	0.1	0.3	0.1 (0.5)
Pb	Industrial pollution	10 µg/L	50 µg/L	50 (100) µg
Mg		30	50	50 (70)
Mn	Geology, mining	0.05	0.1	0.05 (0.1)
Hg	Geology, industrial pollution	1 µg/L	5µg/L	1 (2) µg
NO_3	Agriculture and urbanisation. Vegetation breakdown and faecal pollution	6	10	6 (10)
Phenols	Industrial pollution, pesticides and disinfectants	1 µg/L	10 µg/L	5 (10) µg
Se	Geological, industrial	20 µg/L	50 µg/L	
S	Geological,(→ acid mine drainage) industrial	200	400	
THMs	Former when water containing organics is chlorinated	100 µg/L	200 µg/L	
TDS	Inorganic salts, minerals in rocks and decomposing plant material	450	1000	
Turbidity	Suspended material from clay/soil and organic matter	1	5	
V	Industrial pollution	0.1	1.0	
Zn	Geology and industrial pollution	3	5	

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