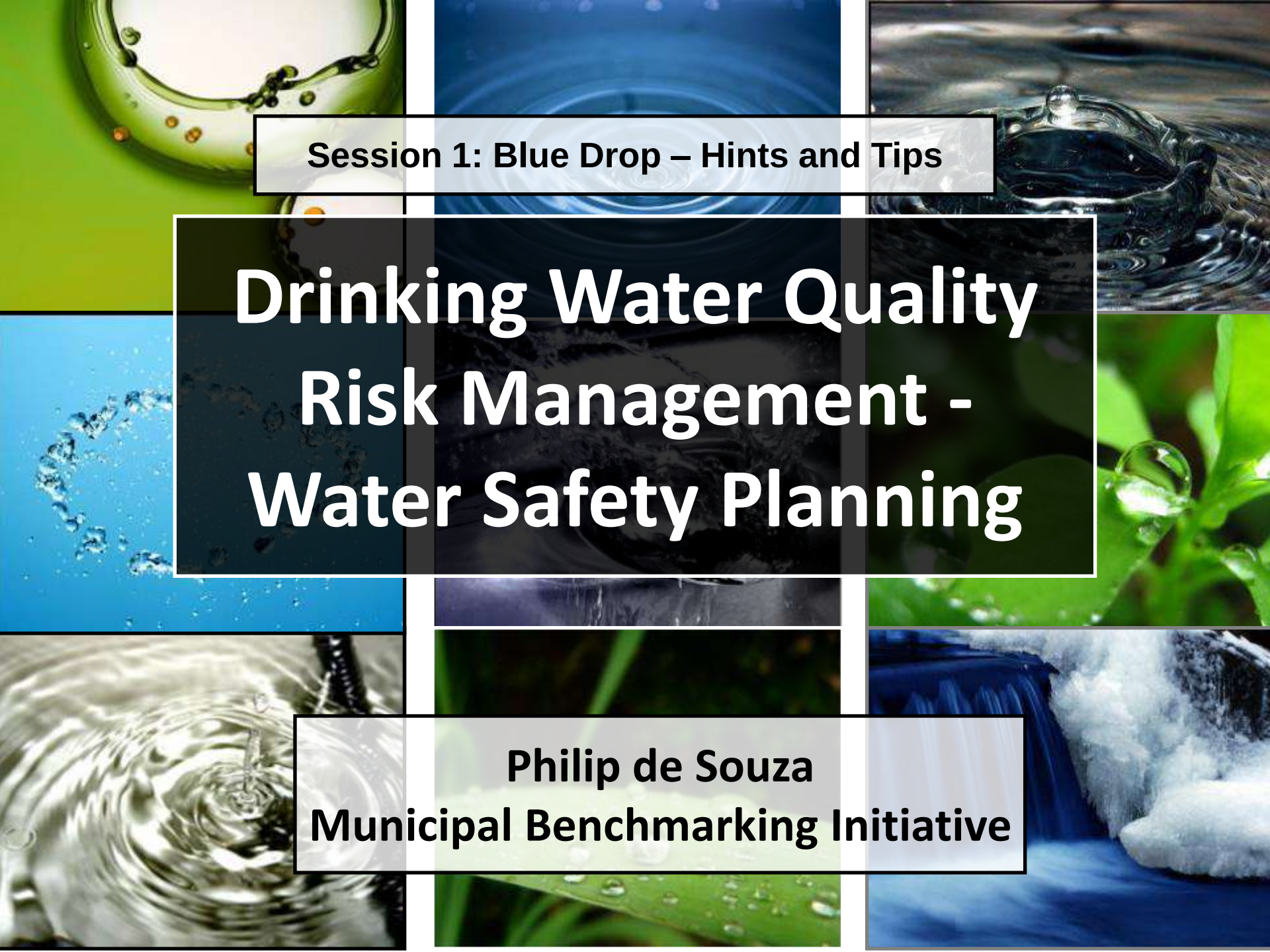


Session 1: Blue Drop – Hints and Tips

Drinking Water Quality Risk Management - Water Safety Planning

Philip de Souza
Municipal Benchmarking Initiative




Water Safety Plan

vs.

Water Safety Planning

Is there a difference????


IMPROVE
PLAN
ACT
EVALUATE

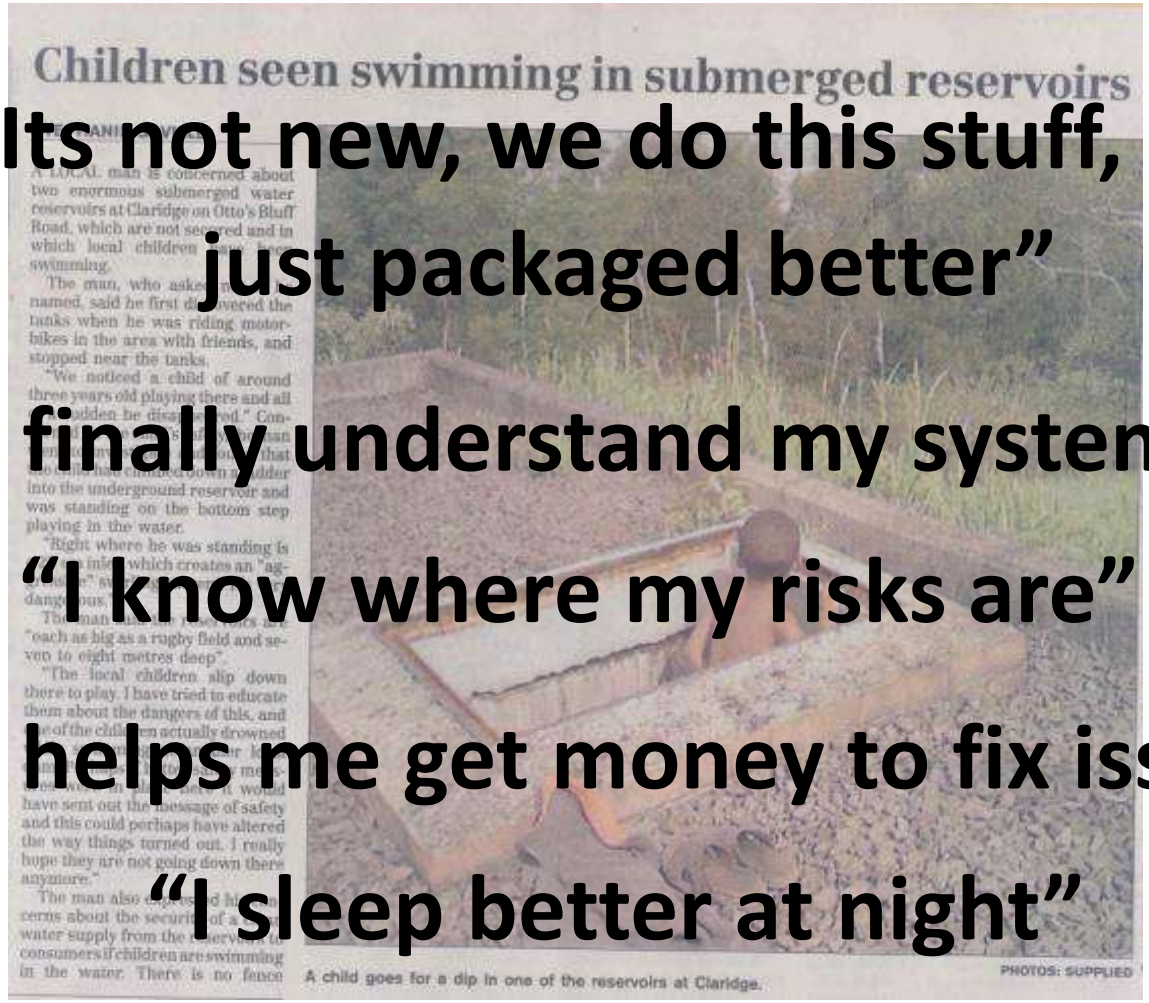
Blue Drop & Water Safety Planning

Key Performance Area		KPA Percentages			Key Performance Indicator		KPI Percentages		
		Year 4	Year 5	Year 6			Year 4	Year 5	Year 6
1	Water Safety Planning	30	35	35	1.1	Water Safety Planning Process	10	10	5
					1.2	Risk Assessment and Review of Control Measures	30	30	35
					1.3	Risk-Based Monitoring Programmes	25	25	25
					1.4	Credibility and Submission of Drinking Water Quality Data	20	15	15
					1.5	Incident Management	15	20	20

- Proof / Evidence / Show me!
- Management commitment!
- Preparation and planning – not last minute!

If you fail to plan, you plan to fail!!!

Why Do We Need Water Safety Planning?


Children seen swimming in submerged reservoirs

two enormous submerged water reservoirs at Claridge on Otto's Bluff Road, which are not secured and in which local children

swimming.

The man, who asked

named, said he first discovered the tanks when he was riding motorbikes in the area with friends, and stopped near the tanks.

"We noticed a child of around three years old playing there and all

ladder into the underground reservoir and was standing on the bottom step playing in the water.

"Right where he was standing is

which creates an "ag-

"each as big as a rugby field and seven to eight metres deep".

"The local children slip down there to play. I have tried to educate them about the dangers of this, and

of the children actually drowned

have sent out the message of safety and this could perhaps have altered the way things turned out. I really hope they are not going down there anymore."

The man also

concerns about the security of

water supply from the

consumers if children are swimming in the water. There is no fence

A child goes for a dip in one of the reservoirs at Claridge.

PHOTOS: SUPPLIED

"Its not new, we do this stuff, its just packaged better"

"I finally understand my system"

"I know where my risks are"

"It helps me get money to fix issues"

"I sleep better at night"

Source: Peter Thompson (Umgeni Water)

Water Treatment

Distribution

Consumer

Wastewater Treatment

Catchment

Resource

“The most effective means of consistently ensuring the safety of a drinking-water supply is through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer. In these Guidelines, such approaches are called water safety plans (WSPs)”. The words above open Chapter 4 of the Third Edition of the WHO Guidelines for Drinking-water Quality (2004)




Water Safety Planning Steps

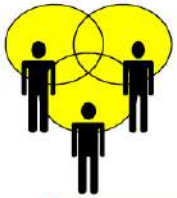
1. Assemble project team/key stakeholders
2. Document and describe the present water supply and distribution system
3. Assess the water supply and distribution system
4. Undertake a hazard assessment
5. Identify control measures
6. Verify that the WSP is operational
7. Draft management procedures
8. Develop supporting programmes
9. Establish document and communication procedures
10. Review of the WSP




DEVELOPMENT OF A WATER SAFETY PLAN

Step 1: Water Supply System Assessment

Assemble team of expertise to carry out a Water Safety Plan



Define the intended use of water

Example:


Industrial


Domestic

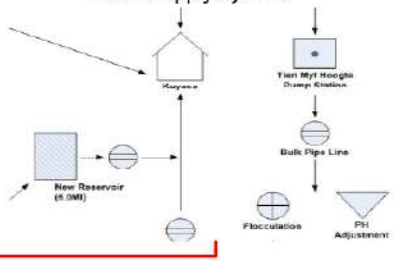

Agricultural

Describe the Water Supply System ?

Collect on:

1. Water sources
2. Water treatment
3. Distribution network
4. Procedures

Compile a flow diagram of the Water Supply System



Step 2: Risk Assessment

Identify Hazards & Hazardous events


Surface- & Ground water source


Treatment systems


Distribution of water


Other water delivery systems

Assess the risks of the hazard in terms of:

RISK RATING = LIKELIHOOD X CONSEQUENCE

LIKELIHOOD	RATING	CONSEQUENCE	RATING
Almost certain (once a day or permanent feature)	1	Catastrophic (Death expected from exposure)	100
Likely (once per week)	0.8	Major (Population exposed to significant illness)	70
Moderately likely (once per month)	0.5	Moderate (Large aesthetic impact)	20
Unlikely (once per year)	0.2	Minor (Small aesthetic impact)	2
Rare (1 in 5 years)	0.1	Insignificant (No impact)	1

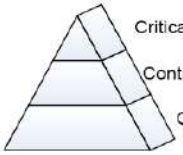
Prioritize risk in terms of the rating

↑ score — High risk

↓ score — Low risk

Step 3: Risk Management

Identify control measures to reduce levels of hazards



Corrective Actions to control measures

Must be supported by **Contingency plan**

Define how control measures will be monitored

A monitoring plan is vital NB to ensure control measures are closely monitored

Establish procedures to verify that the Water Safety Plan is working effectively

Verification includes:

Audit

Spot checks

Develop supporting programmes

Examples:

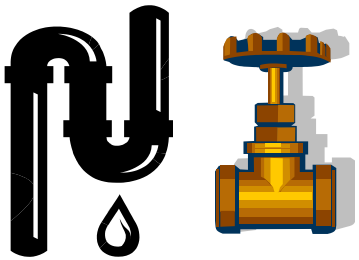
Training

Tools for managing actions of staff such as quality assurance systems

Prepare Management Procedures for

Emergency situations

Essential WSP Actions



System Assessment

Effective Operational Monitoring

Management




Step 1:
Assemble Project Team/Key Stakeholders




Assemble Project Team/Key Stakeholders

Multi-disciplinary team (not 1 person)

(1) water services managers, engineers & technicians, (2)operational staff of treatment plants (if applicable), (3) WQ managers/specialists, (4) financial managers, (5) catchment managers, (6) WSPs, (7) environmental, public health or hygienist professionals (8) consumer representatives

Choose a Leader!

Consider location (who is impacting, who are the users)

Assemble Project Team/Key Stakeholders

	Name	Organization	Team Role/Position	Contact Number	E-mail
1					
2					
3					
4					
5					




Step 2:
Document and Describe the Present Water Supply and Distribution System




Document/Describe System

Understand the system

Source (type, yield, quality)
Water Treatment Works (processes, capacity)
Reservoirs (types, capacity)
Network (pump stations, valves, pipes, etc)

Refer to as-built drawings, documents, etc

If don't know → find out! (and improve record keeping)

If still don't know → site visits!

Document/Describe System

Symbol chart for drawing flow diagrams of water treatment systems

1	**Source Water**			
	Ground		Surface	
2	**Raw Water Storage Reservoir**			
	Open		Closed	
3	**Pre-Treatment**			
	Fluoride		Iron and Manganese	
	Taste and odour		Pre-Disinfection	
4	**Water Treatment Processes**			
	Coagulation		Flocculation	
	Sedimentation		Filtration	
	pH adjustment		Disinfection	
5	**Distribution**			
	On-site service		Off-site service	
	Booster stations		Valves	
6	**Consumer**			
	Pipes		Standpipes and house	

Step 3:
Assess the Water Supply and Distribution System




Assess the System

Conduct a site visit – not a desktop assessment!

A team to assess

Camera, GPS, pen/notebook
→ Evidence!

A keen eye!

Come back to office and complete assessment

Preparation for risk assessment




Does the plant comply with the requirements of the occupational safety, health and environmental act (OSH Act 1993)?	YES	NO	SPECIFY
Does the treated water meet the current standards (SANS 241) for drinking water quality?	YES	NO	SPECIFY
Are there leaks in the chemical mixing tanks?	YES	NO	SPECIFY
Is the chemical mixing tank maintained in a clean condition? (i.e. free from deposits/spillage/scum)	YES	NO	SPECIFY
Are there evident hydraulic surges at the raw water intake of the works?	YES	NO	SPECIFY
Is the sedimentation tank maintained in a clean condition? (i.e. free from deposits/algal growth/scum)	YES	NO	SPECIFY
Is the sand on the filter bed even?	YES	NO	SPECIFY
Is the filter backwashed according to its design guidelines?	YES	NO	SPECIFY
Are there mud balls or cracks in the filters?	YES	NO	SPECIFY
Are there evident cross connections between backwashed and treated waters?	YES	NO	SPECIFY
Is there evidence of insufficient coagulant dosing?	YES	NO	SPECIFY
Is the plant able to achieve the required residual chlorine levels?	YES	NO	SPECIFY
Has the works exceeded 75% of its volume capacity (Ml/day)?	YES	NO	SPECIFY
Does the works have flexibility to meet demands for the next 5 years?	YES	NO	SPECIFY
Does the plant have a regular supply of treatment chemicals?	YES	NO	SPECIFY

Step 4:
Hazard and Risk Assessment




Definitions

- Hazard
  - A biological, chemical, physical and/or radiological agent that has the potential to cause harm
- Hazardous event
  - An incident or situation that can lead to presence of a hazard
- Risk
  - Likelihood of identified hazards causing harm in exposed populations in a specified time frame.
    - Likelihood → “how often” or “how likely”
    - Consequence → severity/impact
- Critical Control Point
  - A point, step or procedure at which controls can be applied and a hazard can be prevented, eliminated or reduced to acceptable levels

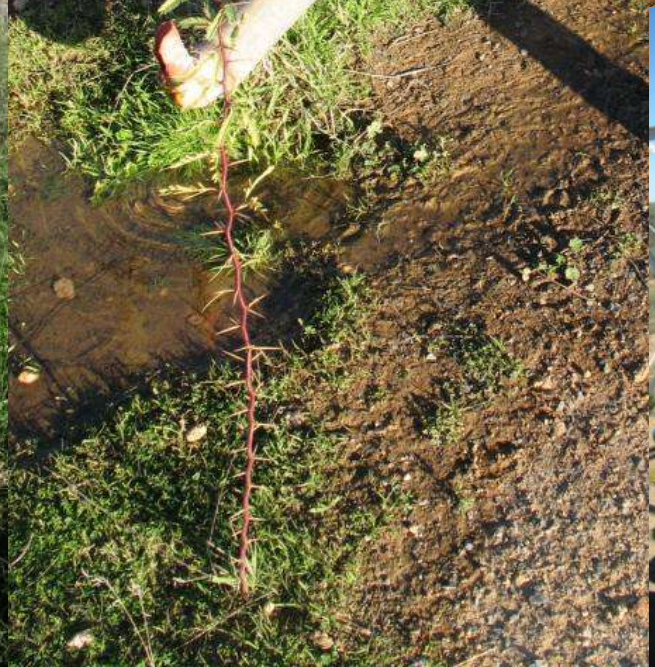

Source













Treatment


GIF - POISON
ALLDOS


MIXED
LOAD

Reservoirs

Consumer




Hazardous Event vs. Hazard

- Link the Hazardous Event to a “Hazard”
  - What are the hazards if there are children swimming in my dam?
  - What are the hazards if I do not dose sufficient chemicals?
  - What are the hazards if I dose too much alum?
  - What are the hazards if I do not have a working rapid sand filter at my water treatment works?
  - What are the hazards if there are dead animals in my reservoir?
  - What are the likely hazards if there is a overflow of raw sewage into my resource
  - What are the hazards if my staff do not have safety equipment?

Primarily health BUT issues of safety, asset management, etc → Need to put controls in place




Risk Assessment Matrix

Shortcut	Likelihood	Rating	Shortcut	Consequence	Rating
A1	**Almost Certain** Once a day or Permanent Feature	1	A2	**Catastrophic** Death expected from Exposure	100
B1	**Likely** Once per Week	0.8	B2	**Major** Population exposed to significant illness	70
C1	**Moderately Likely** Once per Month	0.5	C2	**Moderate** Large Aesthetic Impact	20
D1	**Unlikely** Once per Year	0.2	D2	**Minor** Small Aesthetic Impact	2
E1	**Rare** 1 in 5 Years	0.1	E2	**Insignificant** No Impact	1

RISK RATING = LIKELIHOOD X CONSEQUENCE

Risk Rating	Range
Low	0-10
Medium	11-56
High	57-100

Make sure method is clear and consistent for ALL systems!

WHO, WRC recommended




Risk Calculation

ource Water

	Potential Hazards or Hazardous Events	Valid Hazard / Hazardous Event	Hazard Category	SANS 241	Hazard Name (Water Quality Determinand)	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile
	Surface Water (Rivers and Streams)										
1	Livestock, human activity at water source.	Yes	Safety	E.coli or Faecal coliforms	E.coli or Faecal coliforms	Moderately likely	0.5	Minor	2	1	Low Risk
2	Raw water turbid after heavy rain. May contain droppings of animals and birds.	Yes	Finances	Turbidity	Turbidity	Not applicable	0	Not applicable	0	0	No Risk
3	Dead animals.	No	Safety	N/A		Not applicable	0	Not applicable	0	0	No Risk
4	Droppings of animals/birds can introduce harmful micro-organisms into the water body.	Yes	Design	E.coli or Faecal coliforms	Giardia species, E.coli or Faecal coliforms	Likely	0.8	Catastrophic	100	80	High Risk
5	Low flow, high nutrient levels and warm conditions - can make cyanobacterial and algal growth more likely.	Yes	Water Quality Variability	Odour or Taste	Odour or Taste	Rare	0.1	Moderate	20	2	Low Risk
6	Falling water levels due to drought or drawdown of water body.	No	Operation	N/A		Not applicable	0	Not applicable	0	0	No Risk
7	Vandalism or sabotage may pollute the water with chemicals or microbes or damage equipment and infrastructure.	Yes	Design	N/A		Likely	0.8	Moderate	20	16	Medium Risk
					Cryptosporidium						




Step 5:
Identify Control Measures

Identify Control Measures




Control Measures & Corrective Actions

	A	B	C	D	E	F	G
1	**Water Safety Plan Tool**						
2	**Step 10 of 11**						
3	**Control Measures and Corrective Actions**						
4	**This step is:**		Incomplete				
5	**Evaluation of Existing Control Measures and Corrective Actions**						
6	**Component**	**Hazard**	**Valid Hazard / Hazardous Event**	**Hazard Category**	**Hazard Name (Water Quality Determinand)**	**Risk Rating**	**Risk Profile**
56	Network	Roof paint contains chemical contaminants.	Yes	Design	Free Chlorine, Conductivity at 25◦C, pH at 25◦C, Ammonia as N, Antimony as Sb	35	Medium Risk
57	Network	Foliage collection over/along gutters and rooftops.	Yes	Operation	E.coli or Faecal coliforms, Selenium as Se, Dibromochloromethane	80	High Risk
58	Network	Bird/animal droppings contaminate water.	Yes	Maintenance	0	0.2	Low Risk
59	Network	First flush of water can enter storage tank.	No	Design	0	0	No Risk
60	Network	Chlorine under dosing.	Yes	Operation	0	35	Medium Risk
61	Network	Chlorine overdosing.	Yes	Operation	0	10	Low Risk
		Re-contamination of water due to					

7. DW Treat Risk | 8. Network Evaluation | 9. Network Risk | **10. Corrective Actions** | 11. Summ

Who?
What?
When?




Control Measures & Corrective Actions

Risk Rating	Risk Profile	Control Measure in Place (if any)	Control Measure Effectiveness (%)?	Residual Risk Rating	Residual Risk Profile	Corrective Actions	Who? (Responsible Person)	When? (Date)	Estimated Cost?
0.2	Low Risk		80%	0.0	Low Risk				
35	Medium Risk		70%	10.5	Medium Risk				
80	High Risk	Yes, fence but old, gate often left open	30%	56.0	Medium Risk	Fix fence, ensure gate locked	P de Souza	14/04/2012	R 5 000
0.2	Low Risk		80%	0.0	Low Risk				
0	No Risk			0.0	No Risk				

Consider: (1) quick wins, (2) Cost : Risk Reduction, (3) social impact/consumer confidence, (4) environmental impact




Sign-Off by Management

City of Cape Town Faure Water Scheme

Delete

Additional Resources

- WRC_Water_Safety_Plan_Tool_eWQMS_Version_Nov_2010.xlsx
- WRC_WSP_ Possible_Corrective_Actions.doc
- WRC_Development_of_a_ Generic_Water_Safety_Plan_Guide.pdf
- WHO_IWA_Water_Safety_Plan_Manual.pdf
- Water_Safety_Plan_Report_Template.doc
- WSP_Flow_Diagram_Template.doc

Commitment
&
funding to fix!!

APPENDIX B: IMPLEMENTATION AND OWNERSHIP OF THE WATER SAFETY PLAN

ABC MUNICIPALITY
Water Safety Plan:
XYZ Water Supply System

The specific recommendations made in this plan are considered and some of the risks have already been addressed and mitigated. In particular the municipality prioritises those risks which can directly link to failure of water quality. It is therefore in the interest of the municipality that the following risks are prioritised and addressed accordingly.

(Copy/paste all highest risk issues here with associated responsible persons)

Risk	Responsible person/s
Raw Water Source	
Water Treatment Works	
Distribution Network	

The management of ABC Municipality understands the importance of implementing the corrective actions/control measure to reduce the risks identified in this Water Safety Plan and is striving to improve the service and quality of the water.

Signed by: .....on the day .....20..


IMPROVE
PLAN
ACT
EVALUATE




Step 6:
Verify that the WSP is Operational

Verify that the WSP is Operational

What should you be checking on a regular basis to make sure your control measures are effective?

Develop your Risk based Monitoring Programme

WQ Monitoring (data credibility, consider and plan for new SANS 241, DWA must receive data monthly)

Step 7:
Develop Management Procedures




Develop Management Procedures

- Normal conditions
- Emergency conditions
  - Drinking Water Quality Incident Management Protocol:
    - Alert Level I, Low Risk: Routine problems including minor disruptions to the water system and single sample non-compliances
    - Alert Level II, Moderate Risk: Minor emergencies, requiring additional sampling, process optimisation and reporting/communication of the problem.
    - Alert Level III, High Risk: Major emergencies requiring an active Emergency Management Team.




Step 8:
Develop Supporting Programmes




Develop Supporting Programmes

Supporting programmes:	
1. Security / control of access to facilities and catchments	Yes / No
2. Chemical and material verification protocols	Yes / No
3. Use of designated equipment	Yes / No
4. Training and education programmes	Yes / No
5. Other:	Yes / No
Supporting programmes: Standard operating procedures (SOP)	
1. Hygienic working practices	Yes / No
2. Training and competence of water supply personnel	Yes / No
3. Tools for management of staff actions (e.g. QA systems)	Yes / No
4. Stakeholder commitment at all levels to provide safe water	Yes / No
5. Education of communities	Yes / No
6. Calibration and monitoring of equipment	Yes / No
7. Record keeping	Yes / No
8. Other	Yes / No

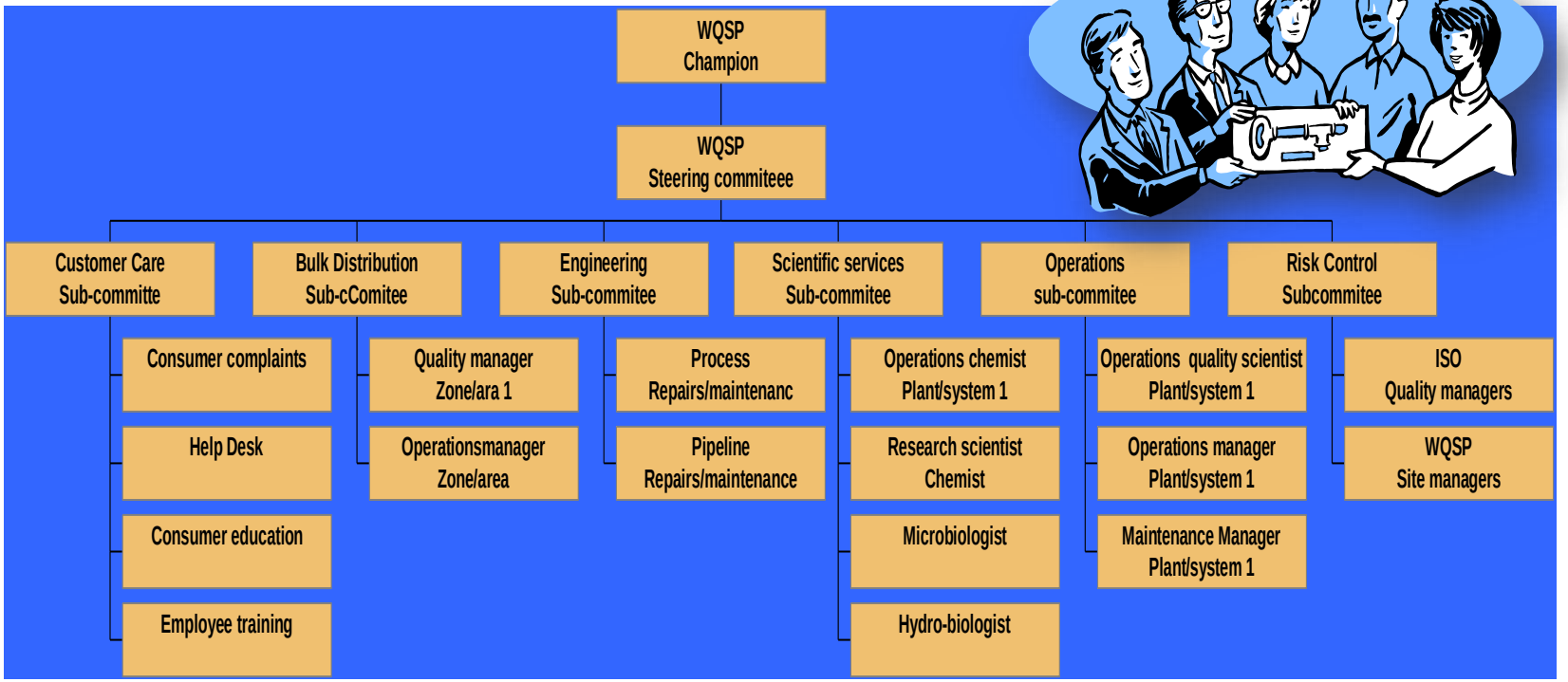
Water Loss Management

Photos: Willem Wegelin (WRP)




Step 9:
Establish Document and Communication Procedures

Establish Document and Communication Procedures



Source: Esper Ncube (Rand Water)

Step 10:
Water Safety Plan Review




Review

Keep plan up-to-date (living process not just a document, not once-off)

Own the plan (not the consultant's plan)

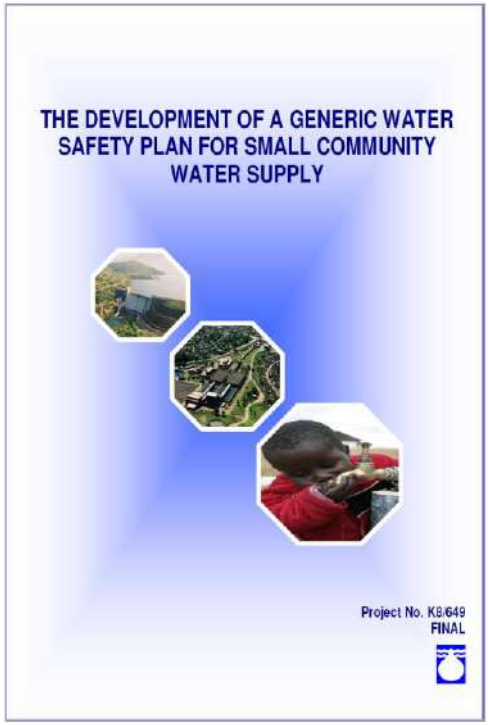
Have regular meetings…

- **Where are we?**
- **What have we done?**
- **What must we still do?**
- **Renewed management commitment!**
- **Required actions, responsibilities, sign-off, money!!**

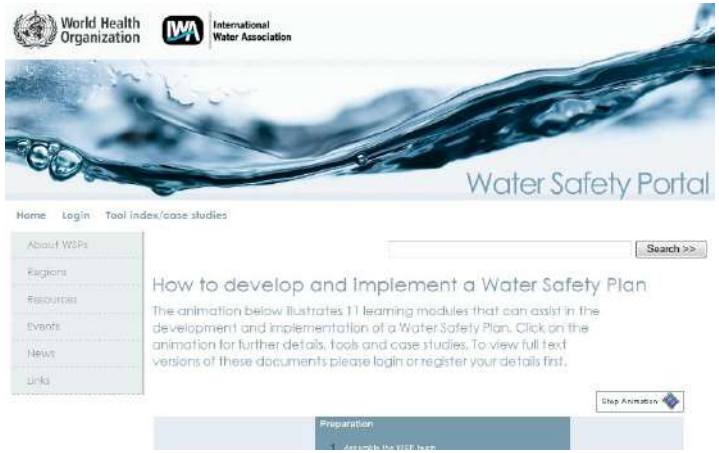
Review at least annually OR if something changes

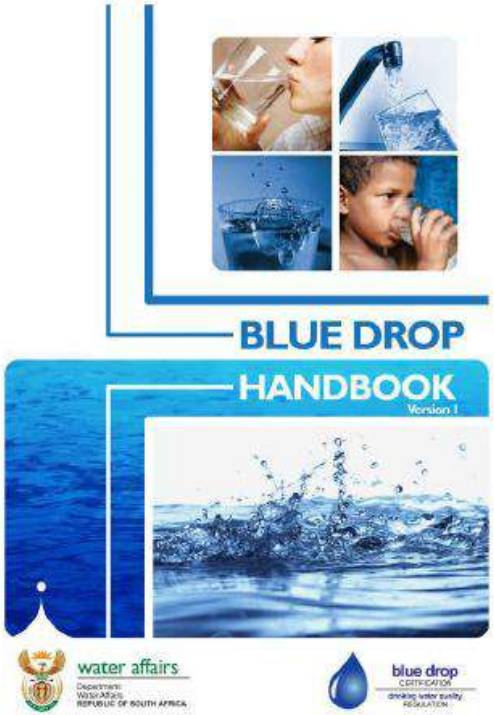

IMPROVE
PLAN
ACT
EVALUATE

Resources


THE DEVELOPMENT OF A GENERIC WATER SAFETY PLAN FOR SMALL COMMUNITY WATER SUPPLY
Project No. K8/649
FINAL

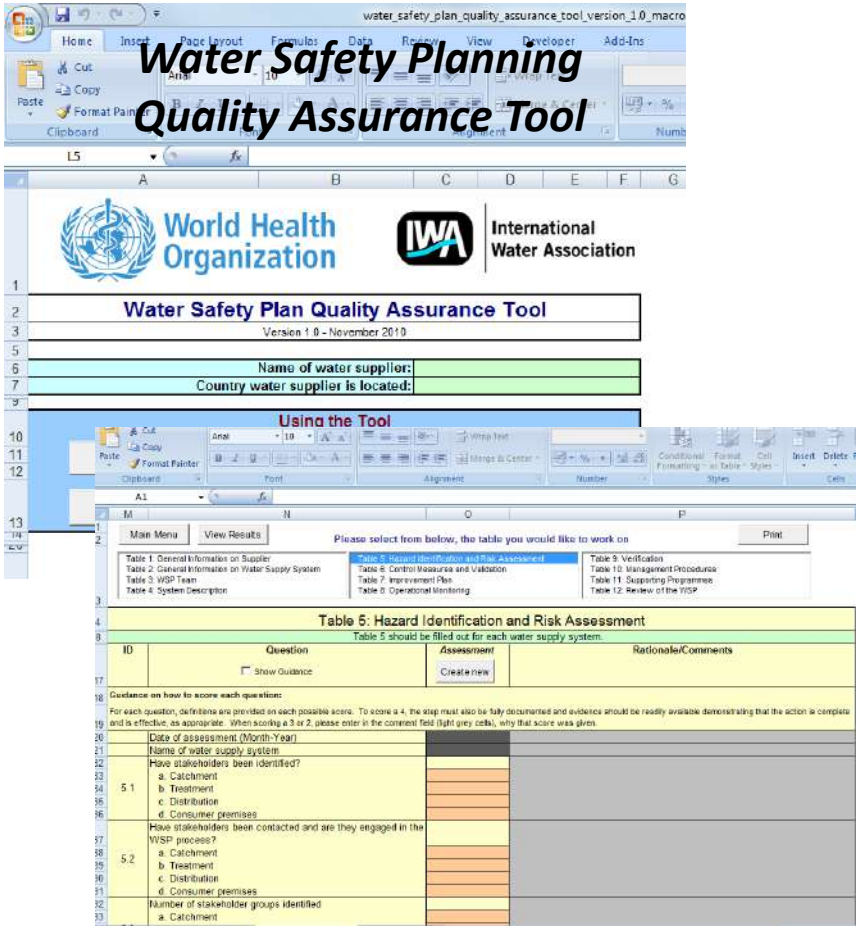

Water Safety Plan Manual
Step-by-step risk management
for drinking-water suppliers


World Health Organization
International Water Association
Water Safety Portal
Home
Login
Tool index/case studies
About WSPs
Regions
Resources
Events
News
Links
Search >>
How to develop and implement a Water Safety Plan
The animation below illustrates 11 learning modules that can assist in the development and implementation of a Water Safety Plan. Click on the animation for further details, tools and case studies. To view full text versions of these documents please login or register your details first.
Step Animation
Preparation


BLUE DROP
HANDBOOK
Version 1
water affairs
blue drop

Tools to Assist with Water Safety Planning

IWA/WHO



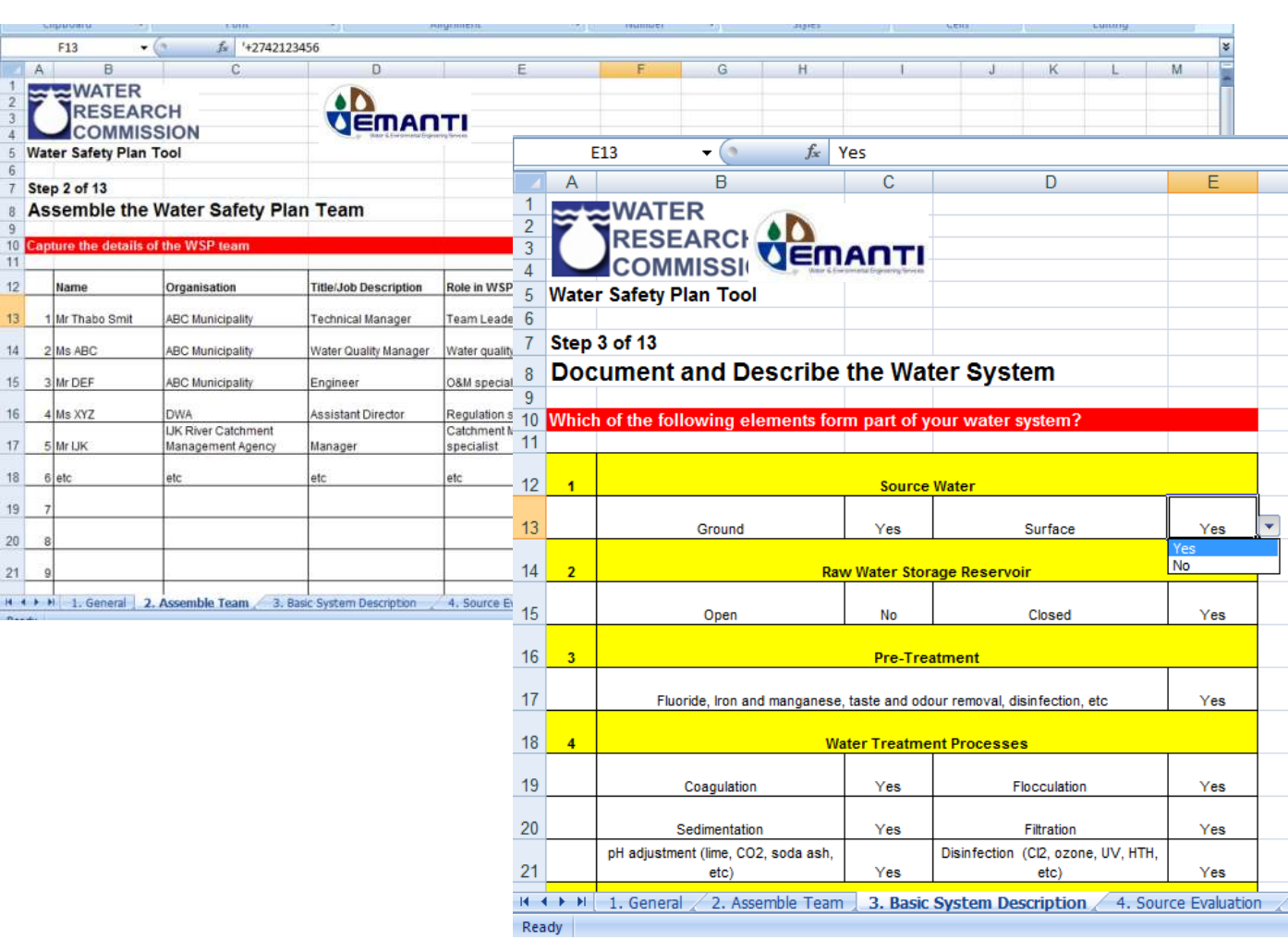
WRC

WRC WSP Tools

- ***Water Safety Plan Tool***
  - Prepare a Water Safety Plan
  - Based on WRC, WHO and other guidelines
  - Also included wastewater components (i.e. integrated water management, alignment with Green Drop requirements)

- ***Water Safety Plan Status Checklist***
  - Rapidly assess progress in the WSP process (i.e. “where are we and what do we still need to do”)
  - Considers typical WSP steps & asks 5 key questions per step
  - A colour-coded “spider-diagram” output is provided of the status

Develop a Water Safety Plan (Excel)



F13 '+2742123456

WATER RESEARCH COMMISSION

EMANTI

Water Safety Plan Tool

Step 2 of 13

Assemble the Water Safety Plan Team

Capture the details of the WSP team

	Name	Organisation	Title/Job Description	Role in WSP
1	Mr Thabo Smit	ABC Municipality	Technical Manager	Team Leade
2	Ms ABC	ABC Municipality	Water Quality Manager	Water quality
3	Mr DEF	ABC Municipality	Engineer	O&M special
4	Ms XYZ	DWA	Assistant Director	Regulation s
5	Mr IJK	UK River Catchment Management Agency	Manager	Catchment M specialist
6	etc	etc	etc	etc
7				
8				
9				

1. General | 2. Assemble Team | 3. Basic System Description | 4. Source Ev

E13 Yes

WATER RESEARCH COMMISSION

EMANTI

Water Safety Plan Tool

Step 3 of 13

Document and Describe the Water System

Which of the following elements form part of your water system?

1	Source Water			
	Ground	Yes	Surface	Yes
2	Raw Water Storage Reservoir			
	Open	No	Closed	Yes
3	Pre-Treatment			
	Fluoride, Iron and manganese, taste and odour removal, disinfection, etc			Yes
4	Water Treatment Processes			
	Coagulation	Yes	Flocculation	Yes
	Sedimentation	Yes	Filtration	Yes
	pH adjustment (lime, CO2, soda ash, etc)	Yes	Disinfection (Cl2, ozone, UV, HTH, etc)	Yes

Yes / No

1. General | 2. Assemble Team | 3. Basic System Description | 4. Source Evaluation | 5. Sou

Ready

Water System Flow Diagram

Water Source

Raw Water Storage Reservoir

Pre-Treatment

Water Treatment Processes

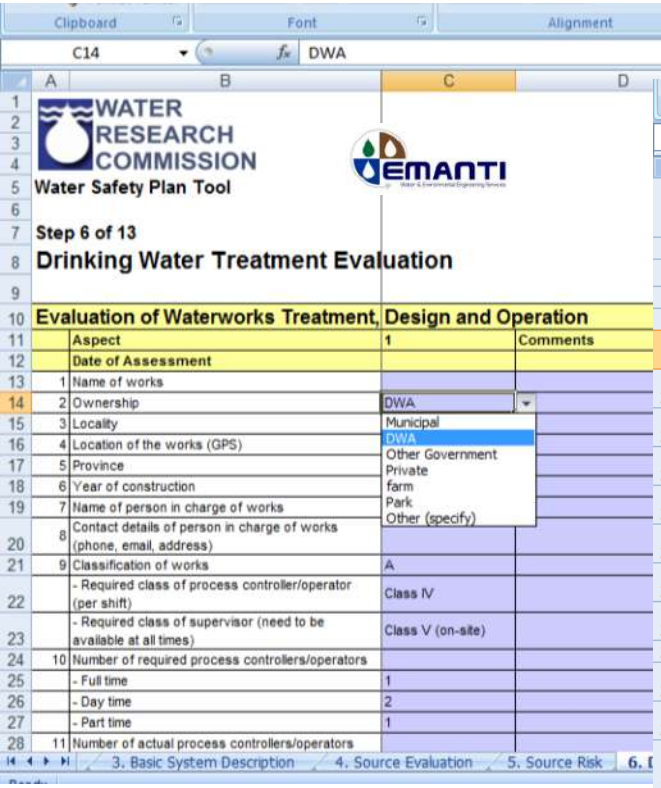
Distribution

Consumer

cription | 4. Source Evaluation




Develop a Water Safety Plan (Excel)



WATER RESEARCH COMMISSION

EMANTI

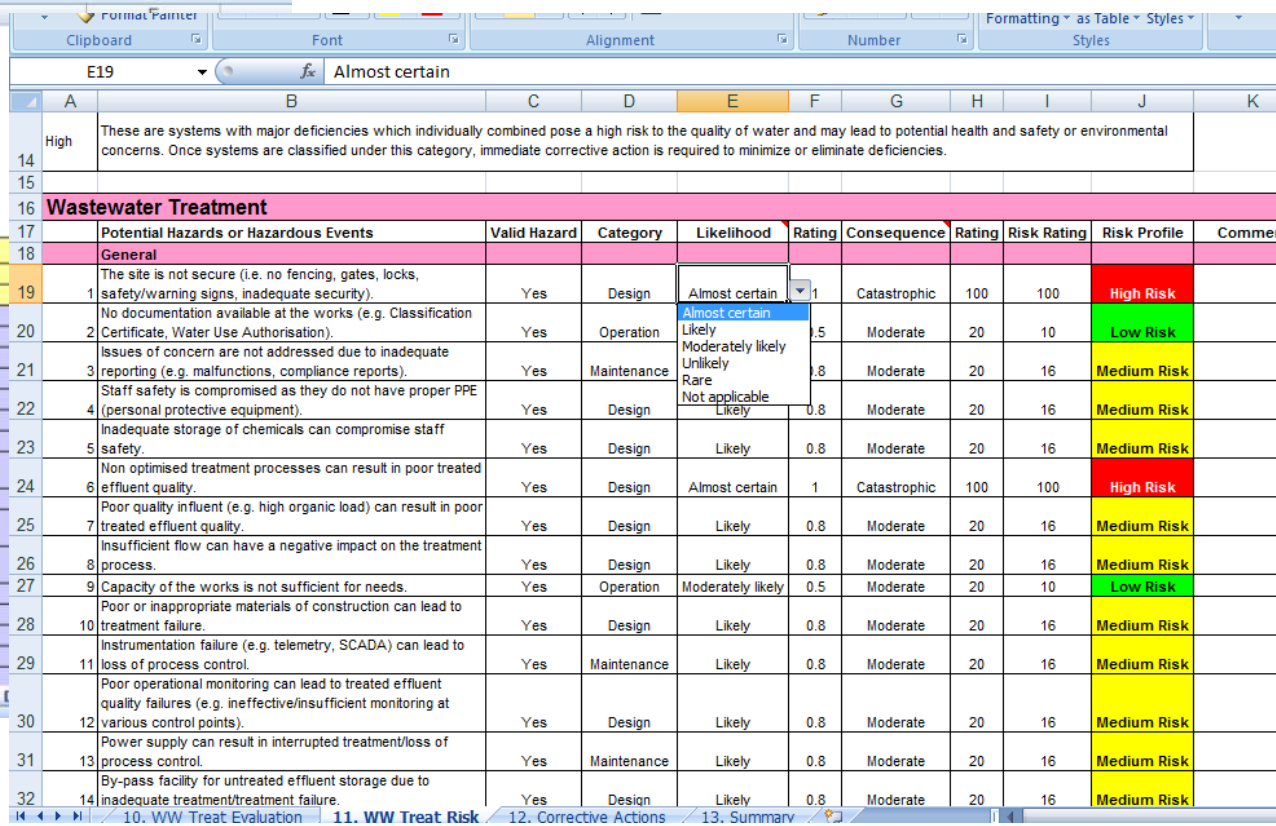
Water Safety Plan Tool

Step 6 of 13

Drinking Water Treatment Evaluation

		Evaluation of Waterworks Treatment, Design and Operation		
		Aspect	1	Comments
		Date of Assessment		
	1	Name of works		
	2	Ownership	DWA	
	3	Locality		
	4	Location of the works (GPS)		
	5	Province		
	6	Year of construction		
	7	Name of person in charge of works		
	8	Contact details of person in charge of works (phone, email, address)		
	9	Classification of works	A	
		- Required class of process controller/operator (per shift)	Class IV	
		- Required class of supervisor (need to be available at all times)	Class V (on-site)	
	10	Number of required process controllers/operators		
		- Full time	1	
		- Day time	2	
		- Part time	1	
	11	Number of actual process controllers/operators		

Ownership dropdown: Municipal, DWA, Other Government, Private, farm, Park, Other (specify)



	High	These are systems with major deficiencies which individually combined pose a high risk to the quality of water and may lead to potential health and safety or environmental concerns. Once systems are classified under this category, immediate corrective action is required to minimize or eliminate deficiencies.								
	Wastewater Treatment									
		Potential Hazards or Hazardous Events	**Valid Hazard**	**Category**	**Likelihood**	**Rating**	**Consequence**	**Rating**	**Risk Rating**	**Risk Profile**
		General								
19	1	The site is not secure (i.e. no fencing, gates, locks, safety/warning signs, inadequate security).	Yes	Design	Almost certain	1	Catastrophic	100	100	High Risk
20	2	No documentation available at the works (e.g. Classification Certificate, Water Use Authorisation).	Yes	Operation		.5	Moderate	20	10	Low Risk
21	3	Issues of concern are not addressed due to inadequate reporting (e.g. malfunctions, compliance reports).	Yes	Maintenance		.8	Moderate	20	16	Medium Risk
22	4	Staff safety is compromised as they do not have proper PPE (personal protective equipment).	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk
23	5	Inadequate storage of chemicals can compromise staff safety.	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk
24	6	Non optimised treatment processes can result in poor treated effluent quality.	Yes	Design	Almost certain	1	Catastrophic	100	100	High Risk
25	7	Poor quality influent (e.g. high organic load) can result in poor treated effluent quality.	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk
26	8	Insufficient flow can have a negative impact on the treatment process.	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk
27	9	Capacity of the works is not sufficient for needs.	Yes	Operation	Moderately likely	0.5	Moderate	20	10	Low Risk
28	10	Poor or inappropriate materials of construction can lead to treatment failure.	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk
29	11	Instrumentation failure (e.g. telemetry, SCADA) can lead to loss of process control.	Yes	Maintenance	Likely	0.8	Moderate	20	16	Medium Risk
30	12	Poor operational monitoring can lead to treated effluent quality failures (e.g. ineffective/insufficient monitoring at various control points).	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk
31	13	Power supply can result in interrupted treatment/loss of process control.	Yes	Maintenance	Likely	0.8	Moderate	20	16	Medium Risk
32	14	By-pass facility for untreated effluent storage due to inadequate treatment/treatment failure.	Yes	Design	Likely	0.8	Moderate	20	16	Medium Risk

Likelihood dropdown: Almost certain, Likely, Moderately likely, Unlikely, Rare, Not applicable




Develop a Water Safety Plan (Excel)

WATER RESEARCH COMMISSION

Water Safety Plan Tool

EMANTI

Step 13 of 13

Summary

NOTE: The results presented below are automatically populated from previous inputs - DO NOT MODIFY H

To prioritise risks, users need to click on "Risk Rating" (column E), then select "Data", "Sort by", "Risk Ratin

Summary Status and Ranking

Component	Hazard	Valid Hazard	Category	Risk Rating	Risk Profile	Cor Mea Plac
Source	Raw water turbid after heavy rain. May contain droppings of animals and birds.	Yes	Design	0	No Risk	0
Source	Dead animals.	No	Maintenance	16	Medium Risk	0
Source	Droppings of animals/birds can introduce harmful micro-organisms into the water body.	Yes	Design	16	Medium Risk	0
Source	Low flow, high nutrient levels and warm conditions - can make cyanobacterial and algal growth more likely.	Yes	Operation	0.1	Low Risk	0
Source	Falling water levels due to drought or drawdown of water body.	No	Maintenance	0	No Risk	0
Source	Vandalism or sabotage may pollute the water with chemicals or microbes or damage equipment and infrastructure.	Yes	Design	16	Medium Risk	0
Source	Intake screens become clogged or damaged.	Yes	Operation	70	High Risk	0
	Bushfires can result in fire retardants in the water					

WATER RESEARCH COMMISSION

Water Safety Plan Tool

EMANTI

Step 13 of 13

Summary

NOTE: The results presented below are automatically populated from previous inputs - DO NOT MODIFY

To prioritise risks, users need to click on "Risk Rating" (column E), then select "Data", "Sort by", "Risk Ra

Summary Status and Ranking

Component	Hazard	Valid Hazard	Category	Risk Rating	Risk Profile	C M P
DW Treatment	Non optimised treatment processes can result in poor water quality.	Yes	Design	100	High Risk	0
DW Treatment	Poor quality raw water can impact treatment process.	Yes	Design	100	High Risk	0
DW Treatment	Insufficient flow can have a negative impact on treatment process.	Yes	Design	100	High Risk	0
DW Treatment	Under dosing of oxidant due to dosing malfunction, power failure, oxidant supply runs out or increased demand on raw water.	Yes	Design		High Risk	0
DW Treatment	Dosing malfunction can reduce floc formation and thus the inefficient removal of harmful micro-organisms, organic material, colour and turbidity.	Yes	Operation	100	High Risk	0
DW Treatment	Dosing malfunction due to equipment failure or power failure. Possible interruption to chlorination (chlorine under dosing, chlorine overdosing).	Yes	Maintenance	100	High Risk	0




Develop a Water Safety Plan (Web)

WRC Water Safety Plan: Calvinia

SECTION: 4 of 9 - Source Water Evaluation

If you are not responsible for operation, maintenance or management of any water source

1. Name of catchment

   Hantam Berge

2. Name of raw water supply source

   Karee Dam

3. Location of source - Latitude (N-S)

   ?

4. Location of source - Longitude (E-W)

   ?

5. Water source of water is used?

   Dam

6. Name and contact details of person in charge of supply

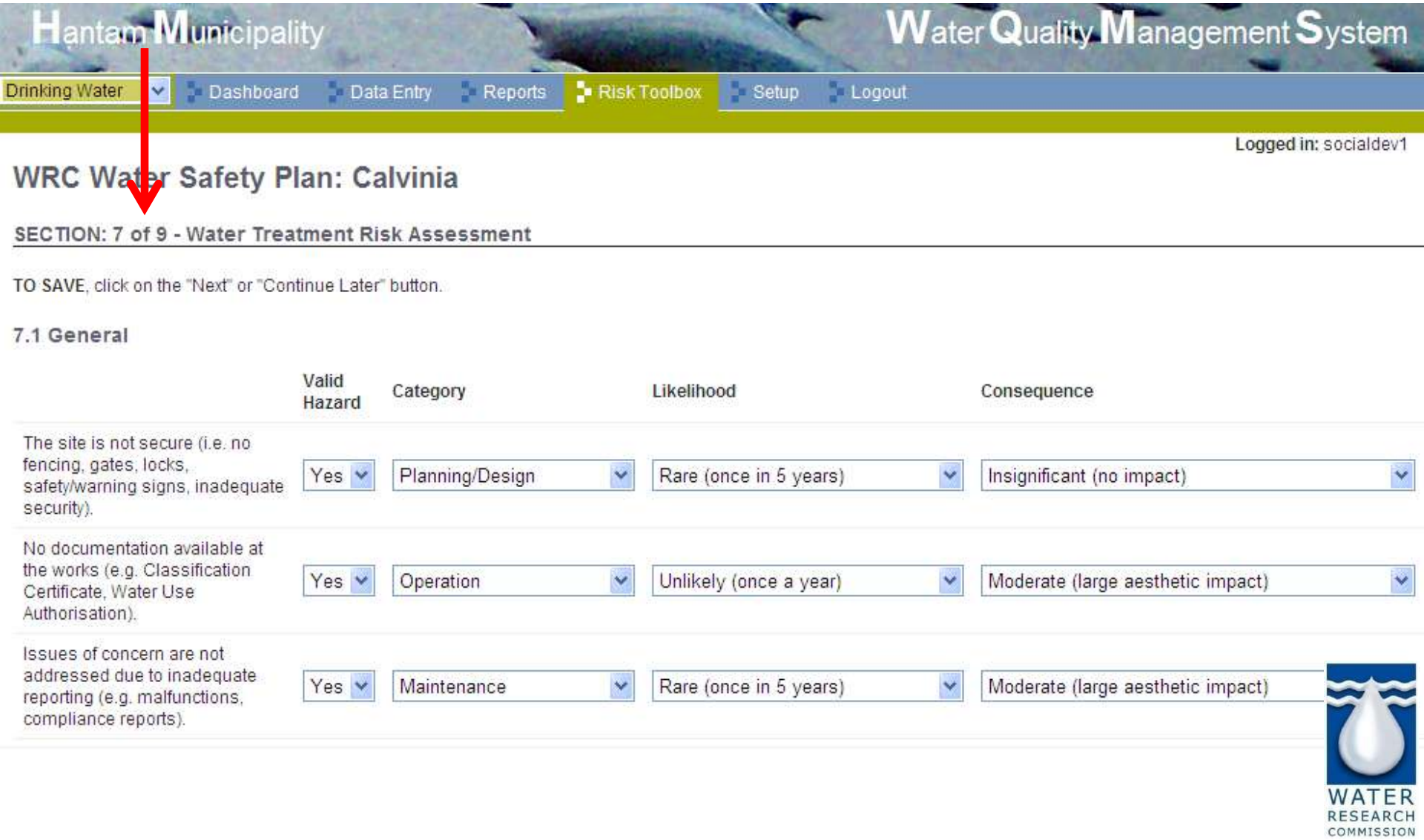
   J. Nel; 0273418500

7. Indicate if the water source is vulnerable to contamination from the following:

   ☐ Upstream activities

   ☐ Agricultural/livestock farms

Develop a Water Safety Plan (Web)



WATER RESEARCH COMMISSION

Develop a Water Safety Plan (Web)

Logged in: socialdev1

Water Safety Plan Summary Report

Risk Profile

No risk	The hazard is not applicable in this instance.
Low risk	These are systems that operate with minor deficiencies. Usually the systems meet requirements specified by the appropriate guidelines/standards.
Medium risk	These are systems with deficiencies which individually or combined pose a high risk. These systems would not generally require immediate action but the deficiencies could be more easily corrected to avoid future problems.
High risk	These are systems with major deficiencies which individually combined pose a high risk and may lead to potential health/safety/environmental/etc concerns. Once systems are classified under this category, immediate corrective action is required to minimize or eliminate deficiencies.

Component	Hazard	Valid Hazard	Category	Risk Rating	Risk Profile	Control Measure in Place (if any)	Is the Control Measure Effective?	Corrective Actions	Who? (Responsible Person)	When? (Date)	Estimated Cost
9.8 Rain Water Harvesting	First flush of water can enter storage tank.	Yes	Planning/Design	35.00	Medium Risk						
9.8 Rain Water Harvesting	Bird/animal droppings contaminate water.	Yes	Maintenance	35.00	Medium Risk						

WATER RESEARCH COMMISSION

Water Safety Plan Checklist (Web)

Drinking Water | Dashboard | Data Entry | Reports | Risk Toolbox | Setup | Admininistration | Logout

WRC Water Safety Plan Status Checklist: Test

SECTION: 1. Water Safety Plan Team

1. A multi-disciplinary team of experts has been assembled to carry out the WSP
   Strongly agree (fully complete/in place)
2. The WSP team has been informed of their duties and are committed to the process
   Agree (substantially complete/in place)
3. A WSP methodology (e.g. steps 1 - 10) has been defined and agreed by the WSP team
   Neutral (partially complete/in place)
4. The WSP team regularly meets to discuss issues, review progress, etc
   Agree (substantially complete/in place)
5. WSP development and implementation is funded and supported by top management
   Strongly agree (fully complete/in place)

Back | Next | Continue later

Water Safety Plan Checklist (Web)

WRC Water Safety Plan Status Checklist: Test

Thank you for completing the questionnaire!

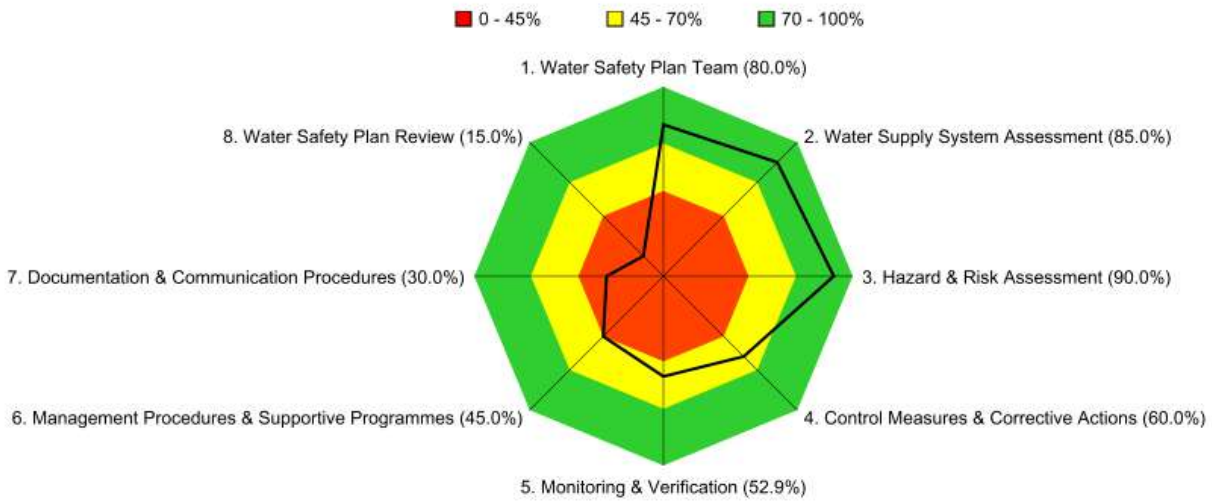
- View Spider Chart

« Return to questionnaires

Logged I

WRC Water Safety Plan Status Checklist

Name	Test
Submitted By	Philip de Souza
Date	07 March 2011



Summary of Key Points (1)

- ✓ Tools/resources are available to help → **But only YOU can take ACTION!**
- ✓ Don't be intimidated!
  - Start small……top 5 issues?
  - Quick-wins → get going!
- ✓ Don't limit your scope!
  - Not just water quality – IAM, safety, etc
  - "Soft" issues are just as important (e.g. staff mentoring)
- ✓ It makes business sense!
  - E.g. Water losses – save money

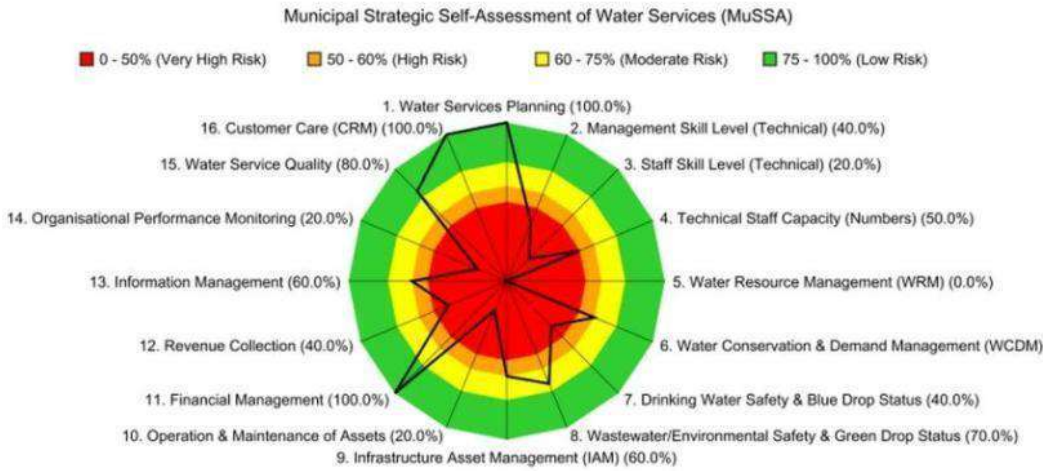



Summary of Key Points (2)

- ✓ You have a plan (congratulations!) – **SO WHAT?? Plan means nothing without ACTION!**
- ✓ Keep plan up-to-date (**living process – NOT a document**)
  - Own the plan (not the consultant's plan)
  - Not once-off
  - Have regular meetings (Where are we? What have we done? What must we still do?)
  - Timeframe, responsibilities and sign-off
- ✓ Involve all levels (top → bottom)
  - Top management buy-in essential!
- ✓ **"we are all consumers"**
- ✓ Tools/resources available → **give feedback** to improve!

Municipal Benchmarking Initiative

- Performance Indicators:
  - ✓ **Municipal Strategic Self-Assessment (MuSSA)**
    - Score for Section 7: Drinking Water Safety & Blue Drop Status
  - ✓ **Regulatory Performance Measurement System (RPMS)**
    - WSA Blue Drop Score
  - ✓ **New SANS 241**
    - DWQ Compliance



Level: National

KPI Dashboard

Key Performance Indicators	Achieved KPI Score	Required score	Compliance Assessment	Performance assessment	Trend of KPI Score
KPI 1: Access to water supply [Overall KPI compliance score]	2.676	3		Concern	
KPI 2: Access to sanitation [Overall KPI compliance score]	2.403	3		Concern	
KPI 3: Access to Free Basic Water [Overall KPI compliance score]	3.995	3		Excellent	
KPI 4: Access to Free Basic Sanitation [Overall KPI compliance score]	0.000	3		Crisis	
KPI 5: Drinking Water Quality management [Overall KPI compliance score]	1.249	3		Crisis	
KPI 6: Wastewater quality management [Overall KPI compliance score]	1.314	3		Crisis	
KPI 7: Customer service quality [Overall KPI compliance score]	3.645	3		Excellent	
KPI 8: Institutional effectiveness [Overall KPI compliance score]	3.314	3.5		Concern	
KPI 9: Financial performance [Overall KPI compliance score]	2.460	4		Concern	
KPI 10: Strategic asset management [Overall KPI compliance score]	3.177	3		Adequate	
KPI 11: Water use efficiency [Overall KPI compliance score]	1.660	3		Concern	

Acknowledgements

WRC, SALGA, DWA, MILE, eThekwini, municipalities & other role players

Thank You!!!

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