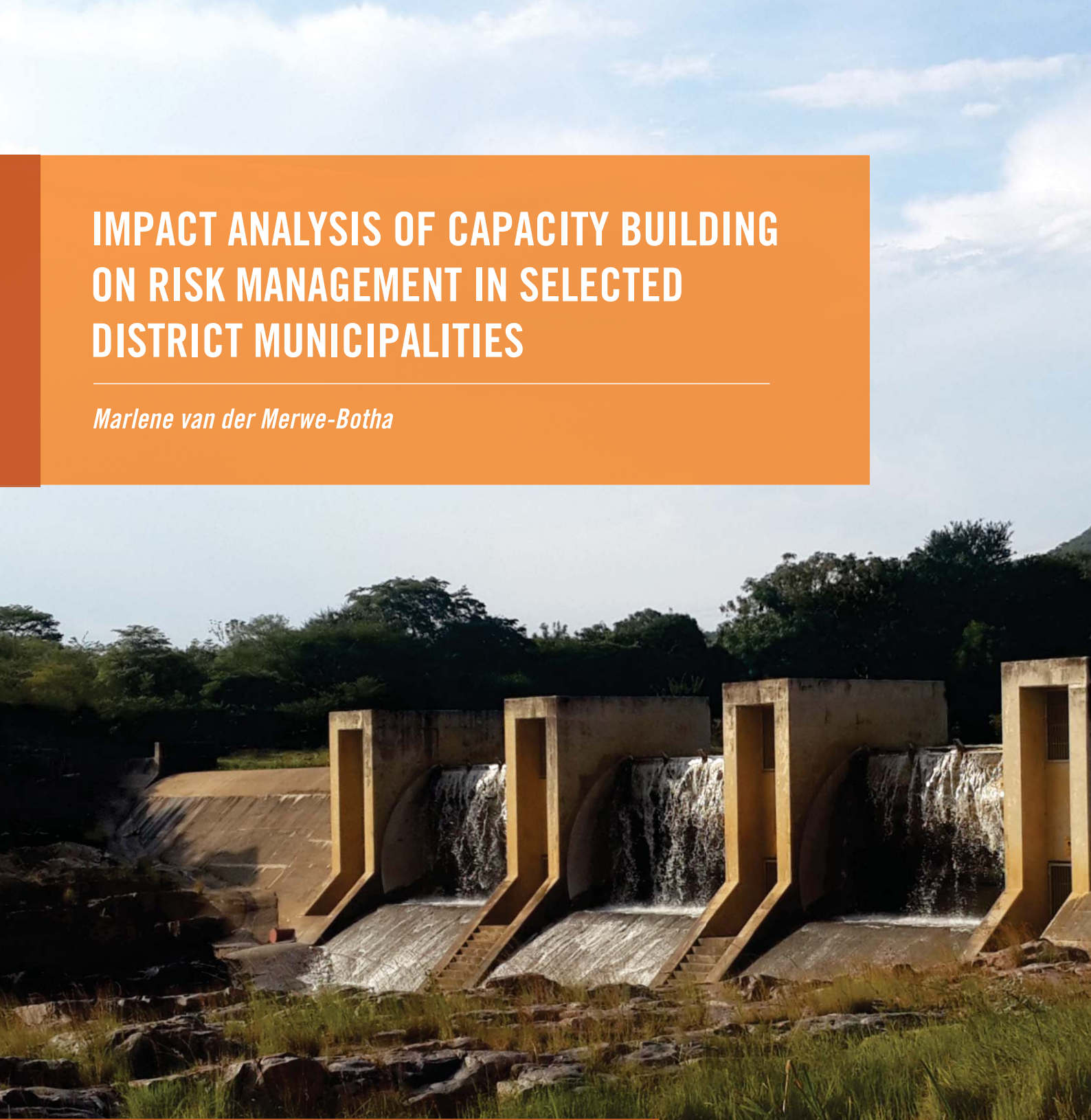
IMPACT ANALYSIS OF CAPACITY BUILDING ON RISK MANAGEMENT IN SELECTED DISTRICT MUNICIPALITIES

Marlene van der Merwe-Botha



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Report to the
WATER RESEARCH COMMISSION
by
Marlene van der Merwe-Botha

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EXECUTIVE SUMMARY

1) Background and purpose of study:

A capacity building support project was implemented during 2014-2016 which assisted selected District Municipalities in KwaZulu-Natal and Eastern Cape to prepare risk-based plans using existing tools and guidelines, whilst developing technical capacity through a learn-and-adapt approach. The municipalities experienced a number of water services and human resource challenges at the time, as identified from the Blue- and Green Drop results of 2013/14. The project methodology made provision to measure the impact of the capacity building project by comparing the Blue- and Green Drop results 'before' and 'after' the project. With the halt of the national Drop Certification programme, the impact could not be measured (WRC Report TT 693).

Subsequently, the WRC commissioned a special study in 2018 with a two-fold purpose: 1) to determine the impact of the risk-based capacity building pilot project at the selected municipalities; and 2) to conceptualise a framework for the roll-out of risk-based capacity building on national scale, by considering the lessons learnt from the WRC capacity building pilot project, as well as other support studies.

The methodology mirrored the study objectives and the results of each study objective are summarised below:

2) Development of a risk-based impact framework, linked to the Blue/Green Drop approach:

Five key principles guided the design of a framework to determine the impact of risk-based capacity building from a previous pilot study (WRC Report TT 693), namely: i) that the impact indicators must be measurable; ii) credible data must be available; iii) comparison of the baseline vs impacted status vs post support must be possible; iv) indicators must link with other sector programmes, i.e. the Blue/Green Drop audit results; v) the continuation study (impact analysis) must benefit and add value to the participating municipalities.

Subsequently, *five key focus areas* were selected to measure impact the impact of risk-based capacity building in the recipient municipalities:

1. Water Services Performance;
2. Risk management;
3. Skills and capacity;
4. Infrastructure management;
5. Business continuity and sustainability.

The five focus areas were supported by the following indicators and measurables:

#	Focus area	Indicator	What to measure
1	Water Services Performance	Improved water services	Overall BD/GD score
2	Risk management	Improved risk management	BD/GD risk score
		Improved risk status	BDR/CRR score
		Reduced vulnerability to manage risk	RiskQ vulnerability assessment

		Success in addressing key challenges identified in 2016	Key challenges that remained after 2016 project
		Multi-disciplinary team involved in risk planning and mitigation	Number of disciplines involved (OFO)
3	Skills and capacity	Improved knowledge to carry out risk-based planning	WSP and W_2RAP questionnaires
		Improvement in skills and capacity	Technical skills; Internal capacity; Social capacity; Reliance on PSPs
4	Infrastructure management	Improved capacity, planning and implementation	Available system capacity, plans, budgets
5	Business continuity and sustainability	Roll-out and integration of risk-based planning into other systems	Implementation, update and integration of risk plans

3) Application of framework to analyse the impact of risk-based capacity building:

Eight municipalities participated in the study: (Eastern Cape): Amathole, Chris Hani and Joe Gqabi; and (KwaZulu-Natal): Amajuba; Harry Gwala; uMzinyathi; uThukela and Zululand.

The results for each municipality are described in detail in terms of: the type of support received during the pilot study; the current status of WSP and W_2RAPs; the value of the pilot study in terms of risk management and capacity development; the results from the analysis using the framework; and the municipality's current risk profile.

4) Trends and comparison of study findings from participating municipalities:

The overall impact of the capacity building pilot project could not be measured with a high level of accuracy, mostly as a result of the lack of baseline data and close-out statistics. However, the research allows a high-level comparison of the results (table below):

- 4 of the 7 participating municipalities improved their risk management practices during the period 2014-2018 (refer to "Sum Column");
- 6 of the 7 municipalities improved or remained the same in terms of risk management, by observing the results from the 24 Risk Indicators;
- the DMs performed better in terms of risk management of drinking water compared to wastewater services, as indicted by the overall upward trend for WSP (↑) and downward trend for W_2RAPs (↓);
- the majority of the DMs displayed lesser vulnerability to risk over time, which implies that the pilot project had a sustainable impact on capacity development;
- one factor that set the better performing four DMs apart from the others, was the involvement of senior management and having an enabling and supportive environment;
- the three DMs that displayed a downward or no-change trends, showed digress in both GD and BD scores, when comparing the 2018 with the 2014 Drop results.

#	District Municipality	24 Risk Indicators	Water Safety Plan			Wastewater Risk Abatement Plan				Sum
			Risk Vulnerable	BD%	WSP%	Risk Vulnerable	GD%	CRR%	W_2RAP%	
1	Amathole	*Reference Municipality (did not receive support in 2015/16)*								
2	Amajuba	↑ (38%)	↓	↑	↑	~	↓	↑	↓	↑
3	Chris Hani	~ (42%)	↑	↓	↑	↑	↓	NI ~	↑	~
4	Harry Gwala	~ (38%)	↑	↓	↑	↑	↓	↓	↓	↓
5	Joe Gqabi	↑ (50%)	↑	↑	↑	~	↑	↑	↓	↑
6	uMzinyathi	↓ (54%)	~	↓	~	~	↓	NI ~	↓	↓
7	uThukela	↑ (54%)	↑	↑	↑	↑	↑	~	~	↑
8	Zululand	~ (42%)	↑	↑	↑	↓	↑	↑	~	↑
	Trend	~ - ↑	↑	↑	↑	~ - ↑	↓	~	↓	↑

5) Uptake and integration of risk management on institutional level:

For all municipalities, it was observed that risk management and associated capacity development are, in general, still not prioritised and not informing or influencing municipal plans, decisions, budgets or resources. This picture is starting to change slowly in municipalities where the internal audit departments are involved in water services risk management. Close linkages between water services risk and health and social risk are apparent, with lesser synergies to financial, economic and environmental risk. Important triggers that resulted in increased risk awareness and mitigation included the Eastern Cape 'baby death' cases, the Blue/Green Drop audits and pressure from agricultural users.

Most municipalities were found to have committed teams on the ground, who were eager and enthusiastic to take up new knowledge and improvement in their water services targets. All municipalities concluded that the suspension of the Blue Drop and Green Drop regulatory audits was a major set back that impacted negatively on water services delivery within their organisations.

Notably, many of the municipalities were engaged in processes of 'business rescue', and/or busy with the incorporation new service providers (i.e. a Water Board) for water services. Also, most of municipalities did not not senior managers attending the interview sessions.

6) Lessons learnt and its impact on national roll-out:

Participating municipalities recommended targeted interventions and actions which they perceived to be 'most important' when rolling out capacity building initiatives in local government (in order of most- to lesser listed recommendations):

1. Capacity building initiatives or programmes must provide specialist support in niche areas, e.g. conducting detailed Process Audits, network assessment and capacity, etc.;
2. DWS must reinstate the Blue/Green Drop Certification programme;
3. Support programmes must be extended over time to include periodic (independent) assessment of progress one to three years after close-out of the initial project; as part of the initial project workplan;
4. Council training is regarded as very important;

5. Refresher training is required to sustain risk-based capacity in municipalties, for both existing staff and new staff recuited;
6. The role of DWS, COGTA and other sector partners in capacity building was previously highly valued, but have been reduced or suspended since 2014 – this practice need to be reinstated;
7. Periodic refresher training on existing tools and guidelines;
8. Focussed training must take place by WRC after the release of technical guidelines, reports and tools – to both the potential user of the tools and by doing a train-the-trainer course (funded, i.e. at no cost to municipalities);
9. Support initiatives must respond to the root causes and well as the immediate scope of problems encountered – a custom-made solution is often not the correct response and need to be adapted to suit the specific municipal challenges;
10. More lesson sharing events, networking and documentation must focus on the theme: "*What are other municipalities doing to address similar problems*";
11. DWS must resuscitate their mandate and role as Regulator to enforce compliance – as *"… there are currently no consequence for failures or non-compliance*";
12. A support programme that identify funding sources and make submissions to fund the implementation of W_2RAPs and WSPs will be a meaningful enabler. DMs are proficient in identifying their gaps and shortcomings, but do not have funding to implement the mitigation / corrective measures;
13. Municipal Internal Auditors must have an increasingly important role in risk management of water services and performance, in order to maintain focus and momentum;
14. WRC and sector support projects must identify the actual gaps and needs of the municpality, and understand its complexities (i.e. political enviroment), before responding with a 'one-size-fits-all' support project;
15. Support projects must provide assistance to incorporate risk mitigation and tracking thereof into the WSP and W_2RAP;
16. Sector partners must run community-based education programs on the importance of saving water.

7) Development of a framework for national roll-out of risk-based capacity building:

A framework was developed by taking insight from approaches in the local and global support environment, the findings of the capacity building pilot project and the risk-based impact analysis study. A systematic methodology are proposed for the roll-out of risk-based capacity building in South Africa by adopting a developmental and differentiated approach, which allows flexibility whilst demanding structure, through a 'learn-and-do' philosophy. The differences in approach from during the pilot study are: i) the development of a national risk-based plan which prioritise interventions on a risk basis; ii) identification and measurement of indicators before- (baseline), during- and after the capacity building project; iii) periodic follow-up assessment/s or impact analysis after close-out of a project; and iv) deviating from a 'one-size-fits-all' capacity building model.

Guided by literature and informed by the capacity building and risk impact analysis studies, the framework comprises of the following actions:

1. Identify municipalities on a risk-based scale of priorities;
2. Establish the capacity building baseline and requirements;

3. Establish partnerships with extension advisors;
4. Conduct a situation analysis;
5. Development of detailed capacity development workstream;
6. Implementation of risk-based capacity building;
7. Development of opportunities;
8. Build capacity through networking and influencing decisions;
9. Build capacity through shared learning events and formal courses;
10. Document lessons and learnings for knowledge sharing in broader sector;
11. Project close-out;
12. Conduct a sustainability review.

Although this process was developed specifically for risk-based capacity building, the model would apply to various capacity building initiatives in the water services sector.

8) Recommendations and further work:

The recommendations from the study are as follows:

1. *Risk-based capacity building*: That the current tools are well developed for entry level risk management and in no need of major changes. The municipalities related well to the tools and reports and apply them in their workplace. However, refresher courses need to be held to reinstate and ensure continued uptake of existing tools, guidelines and documents. These include W_2RAP and WSP guidelines, WSP and W_2RAP excel tools, RiskQ, etc.
2. *Technical capacity building*: Taking que from the variety of documents that the municipalities requested during the research and interview sessions, there is a definite need to share and train municipalities on technical materials produced by WRC, WISA, etc. Material related to sludge handling, oxidation ponds, energy management, sludge classification, inspection of treatment works, etc. are in demand. Technical knowledge and competency is a key requisite for risk management of water services.
3. *Development of a risk tracking tool*: The current tools are focussed on entry level risk management, i.e. risk assessment, rating and prioritisation. The industry requires a new tool for advanced risk management to assist in the tracking of risk implementation, (i.e. quantifying risk mitigation, replacing mitigation measures which have proofed ineffective, budget aspects associated with risk reduction, incorporation of targeted risks, link to asset management, etc.). It is important that this tool build on the existing formats and not be developed from scratch. This approach will ensure that it is seen as a continuance and updated version with familiar characteristics and features, but with added functionality.
4. *Engage the Department of Water and Sanitation*: The results of the study points directly towards the need to have the Blue/Green Drop audits returned to the municipal and public sector. A high level meeting is required to share the results with DWS and facilitate unblocking the reasons for halting of this programme.
5. *Development of a mock Blue/Green Drop self-assessment tool*: In the absence of the Drop Certification programme, the BD/GD tool that was developed to support this study needs to be refined and rolled out for use by municipalities. The tool must be provided with training and demonstration on its use.

6. *Consultation and implementation of the proposed national framework*: The framework for replication and roll-out of a risk-based capacity building programme be shared with sector partners to coordinate and plan for future capacity building initiatives.
7. *Use of risk-based support approach in water resources management:* Capacity building for risk-based planning may be expanded beyond water services to include water resources, which provides for a risk-based planning framework at catchment level.
8. *Directed training and capacity building*: Training may be split into three: i) for municipalities, ii) for organisations that advise municipalities on water and on risk management (e.g. MISA; water boards and CMAs) and iii) for auditors (e.g. CIGFARO conference). An introductory course could be on-line followed by face-to-face support afterwards.
9. *Data mining*: This research study produced a significant amount of data and information which has potential for data mining and input to management information systems that can be used by various information machines to give management diagnostics to municipal managers, i.e. where to focus efforts. Noting, that the Blue/Green Drop was previously used to fill this gap in the sector, and is therefore urgently needed back.
10. *Partnerships*: Partnerships between national and provincial departments, local government, tertiary institutions and private sector are required to roll-out capacity building and skill development in local government.

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- Dr Sarah Slabbert (Sarah Slabbert Associates)
- Ms Chantelle Ramcharan-Kotze (Water Research Commission)
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- Ms Tshepiso Maja (Department of Public Works)
- Mr Solomon Makate (Department of Water and Sanitation).

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- Amathole District Municipality
- Chris Hani District Municipality
- Joe Gqabi District Municipality.

Participating Municipalities and Risk Management Champions in KwaZulu-Natal:

- Amajuba District Municipality
- Harry Gwala District Municipality
- uMzinyathi District Municipality
- uThukela District Municipality
- Zululand District Municipality.

Research contribution:

- Ms Unathi Jack (Emanti Management Group)
- Mr Shawn Moorgas (Emanti Management Group)
- Mr Grant Mackintosh (Emanti Management Group)
- Ms Megan Euston-Brown (Sustainable Energy Africa – SEF)
- Mr Mark Borchers (Sustainable Energy Africa – SEF).

INSIGHT FROM THE REFERENCE GROUP SPECIALISTS

"… Any capacity building project requires a baseline perspective at the very onset of the initiative. How else will one measure the impact… "
(Nontando Mkhize)

"… The Blue- and Green Drops are essentially a regulatory programme, but it really is a capacity building process with 90% of its value in building capacity, transferring knowledge and changing user behaviour through the consultative audit... "
(Nick Tandi)

"… The Drop Inspectors are 'capacity builders'… "
(Dr Sarah Slabbert)

"… Experience in North Africa shows the importance to effectively cross the knowledge path of the end-user. Utilities that are highly successful have 3 attributes: 1. They take advantage of capacity building events; 2. They have a competent technical manager with political support; 3. The gains are protected. In South Africa, the Drops provided a network to protect gains and to protect the people to do their work…"
(Nick Tandi)

"… We are at a stage where some handholding, with the support of specialists, becomes an important strategy to build confidence and technical capacity in municipalities. We hear this from the municipalities themselves in this project… "
(Dr Sarah Slabbert)

"… This WRC project will have far reaching and positive impact if the approach and lessons learnt become an instrument of improving the way we do risk-based capacity building in South Africa… "
(Tshepiso Maja)

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ACRONYMS

Abbreviation	Description
BD	Blue Drop
BDIP	Blue Drop Improvement Plan
BDRR	Blue Drop Risk Ratio
BDS	Blue Drop System
CAPEX	Capital Expenditure
DBSA	Development Bank of Southern Africa
DST	Department of Science and Technology
CFO	Chief Financial Officer
CIGFRO	Government Finance, Auditing and Risk Officers
CMA	Catchment Management Agency
COGTA	Cooperate Governance and Traditional Affairs
CPD	Continuous Professional Development
CRR	Cumulative Risk Rating
DM	District Municipality
DWS	Department of Water & Sanitation
EC	Eastern Cape
GD	Green Drop
GDIP	Green Drop Improvement Plan
GDS	Green Drop System
IDP	Integrated Development Plan
IMP	Incident Management Protocol
IRIS	Integrated Regulatory Information System
KZN	KwaZulu-Natal
LGSETA	Local Government Sector Education and Service Authority
MISA	Municipal Infrastructure Support Agent
MMC	Member of Mayoral Committee
MoA	Memorandum of Agreement
NHS	National Human Settlements
NRF	National Research Foundation
OFO	Organising Framework for Occupations
OFO	Occupational Framework of Officials
OPEX	Operational Expenditure
PAT	Progress Assessment Tool
PDCA	Plan Do Correct Assess
PSP	Professional Service Providers
SAASTA	South African Agency for Science and Technology Advancement
SALGA	South African Local Government Association
SANS	South African National Standards
SDBIP	Service Delivery and Budget Implementation Plan
WIN-SA	Water Information Network of South Africa
WISA	Water Institute of Southern Africa

WRC	Water Research Commission
WSA	Water Services Authority
WSI	Water Services Institution
WSDP	Water Service Development Plan
WSP(P)	Water Safety Planning (Process)
WTP	Water Treatment Plant
WWTW	Wastewater Treatment Works
W_2RAP	Wastewater Risk Abatement Planning

TERMINOLOGY

In context of this study, the following meaning were assigned to terminology used.

- **Analysis** – detailed examination of the elements of a particular practice or structure.
- **Capability** – a measure of the capacity and ability of an entity (person or organisation) to meet its objectives; or of a biological process or infrastructure unit to achieve its design objectives.
- **Capacity building** – process of developing and strengthening the skills, instincts, abilities, processes and resources that organisations and people need to survive, adapt, and thrive in a changing world. This terms reaches over 4 levels: individuals, organisations, sector/networks, and broader enabling environment.
- **Capacity development** – the process to develop human resources, water services structures, as well as institutional and legal frameworks, so that the ability of the individual Water Services Authorities is enhanced to enable effective, efficient and sustainable performance of water services functions (*DWS* W*ater Services: Local Government Capacity Building and Training Support Strategy,* June 2001).
- **Extension** – a process of capacity building through engagement of individuals, groups and communities so that [recipients] are more able to deal with various issues affecting them and opportunities open to them. Extension comprises several activities, i.e. a framework for learning, a specific learning event, a process for developing or modifying specific management practices or technologies, individual mentoring and an on-going access to needed knowledge and information (Water Wheel, 2017).
- **Extension advisors** – the individuals or groups tasked with the provision of learning and capacity building to the recipient municipality. *Also known as 'Service Providers' or 'Implementing Agents'*.
- **Human capacity** (aka **human capital**) – the collective skills, knowledge, or other intangible assets of individuals that can be used to create economic value for the individuals, their employers, or their community.
- **Impact** – to identify the potential consequences of a change or activity, or estimating what needs to be modified to accomplish a change.

(Adopted / amended: from listed references, Blue/Green Drop and open source).

1. BACKGROUND

1.1 INTRODUCTION

Municipalities own and operate wastewater- and drinking water treatment facilities across 9 Provinces in South Africa. The Blue Drop and Green Drop reports of 2013 indicated that many municipalities fail to meet the regulatory requirements, and do not comply with the effluent quality discharge specifications and SANS 0241 standards for drinking water quality (SANS 2015). The inability of many municipalities to perform to expectation and specification can often be tracked to the level of skill, competence and knowledge pertaining to the design and implementation of a prioritised and resourced turnaround plan (van der Merwe-Botha & Manus, 2011; Jack & de Souza, 2013; De Souza et al., 2014).

Non-complying, failing systems carry a high risk to human health and the environment and serve as trigger for the roll-out of capacity building- and support programmes from organisations associated with water services delivery in local government. The WIN-SA Factsheets (2011-2015) are one means of reporting the successes of skills development initiatives which resulted in improved treatment plant performance and water quality. However, no consistent approach or model has been published or adopted to describe and measure the impact of a typical skills development project.

The introduction of incentive-based and risk-based regulation by the national water regulator has been instrumental in reporting performance and compliance at municipal treatment facility level from mid-2000's to 2014. Evidence over the past years have shown that municipalities who embraced the Green Drop principles and who adopted a Water Safety Plan (for drinking water) and Wastewater Risk Abatement Plan (for wastewater services) have not only succeeded to build capacity within their organisations, but have been able to improve service delivery and treatment performance (WIN-SA Factsheets, 2015).

Definition of risk management:

"Risk management is the identification, evaluation, and prioritisation of risks (defined in ISO 31000 as *the effect of uncertainty on objectives*) followed by coordinated and economical application of resources to minimise, monitor, and control the probability or impact of unfortunate events or to maximise the realisation of opportunities." (Wikipedia, ISO 31000, 2018)

Risk-based planning involves different disciplines namely, technical, financial, political, supply chain, environmental and health practitioners, and have shown its capability to mobilise resources, implement priorities, measure performance and monitor progress. A number of WIN-SA reports outline these successes (WIN-SA Lesson Series, 2011-2015).

Risk management asks the question:

"What *(the event/incident)* could go wrong *(the risk),* the probability *(the likelihood)* that it will occur*,* what are the results *(the consequences)* of the incident, what do we have in place to prevent 'the incident' from occurring *(contingency measures or risk control strategy),* and if the event/incident does happen, how do we deal with it *(emergency procedures)"*.

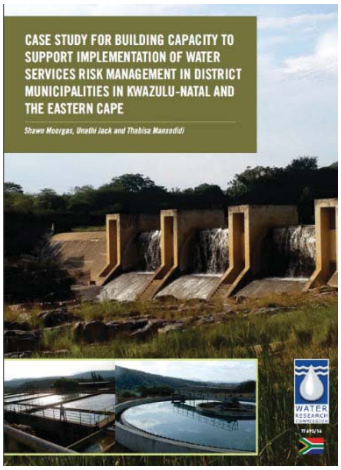
The inclusion of the risk-based approach by the Department of Water & Sanitation (DWS) in the national Blue/Green Drop Certification programme, as well as the development of risk-based guidelines and tools

by the Water Research Commission (WRC), have elevated these philosophies and made it practical to implement risk management in municipalities. The inclusion of a 'cross-pollination' incentive in the Blue/Green Drop audit, allowed municipalities who have mastered risk-based planning, to achieve bonus scores when assisting lesser capacitated municipalities to implement the same. The Regulator itself (DWS) adopted a risk-based management approach in the Upper Crocodile and Berg river catchments. Early publications of the impact of this approach indicated a link between improved water services delivery, risk reduction and improved effluent quality and river water quality (Mupariwa & van der Merwe-Botha, 2013).

The laudable Blue/Green Drop Certification programme was internationally regarded to be a ground-breaking invention by DWS, by providing a consistent, progressive measurement of the status of drinking water and wastewater services across all municipalities in South Africa. The Drop Reports were published annually from 2009 and provided baselines, trends and benchmarks which spearheaded municipalities towards excellence and continuous improvement, whilst contributing to a wealth of secondary research and development programmes in the water sector. Unfortunately, the Drop programme was discontinued in 2014, although it is planned to recommence in 2019 (DWS NWSMP, 2018). The absence of the annual Blue/Green Drop results meant that there was no measurement of the impact of capacity building support initiatives. Hence, from 2014 to 2019, no replacement was available to fill the gap left by the Blue/Green Drop, leaving the monitoring of impact, progress and performance in water services in a void.

The WRC therefore, commissioned a special study in 2018/19 to determine the impact of a risk-based capacity building pilot project that were rolled out at selected District Municipalities in 2014-2016.

1.2 PILOT STUDIES IN KWAZULU-NATAL AND EASTERN CAPE



In partnership with WRC, DST and selected District Municipalities, a capacity building project was implemented during 2014-2016 (WRC Report TT 693/16), within the context of the Blue Drop and Green Drop Certification programme. The support project was designed to assist 23 municipalities in KwaZulu-Natal and Eastern Cape to prepare risk-based plans and to develop technical capacity within the organisations. The identified District Municipalities experienced a number of water services- and human resource challenges at the time, as identified from the Blue/Green Drop results. The WRC research team hypothesis was that, if the DMs could address the key risks associated with water- and wastewater treatment, that a 60-65% improvement in water service delivery could be realised. The 60-65% improvement target, at the time, related to a direct improvement in the Blue/Green Drop performance (Emanti interview, 2018). With the suspension of the Drop audits by the national Regulator in 2014, this target could not be measured at time of close-out of the capacity building pilot project in 2015 (WRC Report TT 693).

The participating municipalities confirmed their aspiration to improve their risk management practice for the following reasons:

- Compliance with Green Drop and Blue Drop audit requirements; and
- To adopt risk management as good business practice within the municipal environment.

The pilot project built capacity through a 'learn-and-adapt' process, whereby the research team worked with the municipal officials to develop and implement risk-based plans specific to their unique challenges.

Risk-based tools and guidelines were used to develop these plans and to build relevant capacity during the execution of the project. The 2014 Blue/Green Drop scores and a Vulnerability Assessment were used to establish the baseline of service delivery at each municipality.

The risk-based tools that was used during the pilot project include the following:

- W_2RAP Guideline for municipalities;
- WSP Guideline for municipalities;
- W_2RAP excel and web-based tool for assessment of wastewater treatment plants;
- WSP excel and web-based tool for assessment of water treatment plants;
- RiskQ which contain a suite of risk measurement tools, including a Vulnerability Assessment Tool.

Technical assistance and capacity development were initially offered to 23 District Municipalities. Twelve (12) municipalities eventually participated in the project to develop risk-based action plans, Water Safety Plans, Wastewater Risk Abatement Plans and participate in knowledge sharing events. The final output from the project comprised of 12 risk-based Action Plans, 9 system-specific WSPs and 4 system-specific W_2RAPs, resulting in the following reports for specific treatment facilities:

- Water Safety Plans: Amajuba (2 systems), Zululand (2 systems), uThungulu (2 systems), uTthukela (2 systems) and OR Tambo (1 system);
- Wastewater Risk Abatement Plans: Ugu (2 systems) and Zululand (2 systems); and
- 12 Action Plans which outlined the activities (corrective measures) that needed to be implemented by the municipal staff during- and after the pilot project.

The results from the study showed that WSAs with high commitment, adequate capacity and internal champions showed satisfactory progress. However, most WSAs found implementation of the plans challenging, mostly due to lack of management commitment, capacity constraints and lacking resources to implement the action plans. The wavering support of the Blue- and Green Drop Certification processes also (negatively) influenced the behaviour and motivation by the municipalities. The research team also found that many of the WSAs lacked system- and water quality information to inform risk identification and prioritisation. Aspects such as the energy demand- and sludge management information was solely lacking.

In terms of capacity building and knowledge dissemination, 212 persons were involved in risk identification and management processes through facilitated workshops, individual engagements and peer review discussions. The municipal officials were found to be willing and enthusiastic to understand risk management for the sake of improving their Blue/Green Drop scores and to embed good business management practice within their organisations.

Based on the initial vulnerability assessment, the support project resulted in improved knowledge, systems and capacity in risk management for both water and wastewater treatment. The lack of commitment by senior management at certain WSAs, was listed as a limiting factor that hampered implementation of risk-based action plans and threatened the long term sustainability of the support project. The research team recommend that:

- future pilots include the Municipal Managers, Portfolio Councillors and Mayors from the start of the project;
- facilitation through existing regional SALGA platforms may assist to profile efforts within the respective WSAs; and

- WSAs must ensure that multi-disciplinary representation of officials jointly drive risk management processes.

1.3 CONTINUATION STUDY TO ANALYSE THE IMPACT OF THE PILOT STUDY

The WRC pilot project was widely acknowledged as a viable model for adoption and possible replication in the South African municipal water sector (NHS, 2016; SAASTA/NRF, 2016; WISA, 2016). However, in the absence of Blue/Green Drop scores at close of the study, it was not possible to measure the real impact of the support project against the initial target of '*60-65% improvement in water services'*. In order to fill this gap, the WRC commissioned a continuation study to assess the impact of the TT 693 project at the participating municipalities.

In the long run, WRC and its sector partners contemplate a national roll-out of similar capacity building projects, should the continuation project verify a meaningful positive impact. The research team responsible for the continuation study was also tasked to obtain perspectives from the pilot study participants, as to which model/s will work best in achieving the objectives of a national risk-based capacity building programme.

1.4 LINK BETWEEN PILOT PROJECT TT 693 AND RISK ANALYSIS (CONTINUATION) STUDY

A 5-W approach was applied to clarify the attributers of the pilot project of 2015 versus the continuation (impact analysis) study of 2018. The 5-W approach is effective when:

- ✓ facing a problem solving scenario (Geoff Hart, TECHWR-L, April 30, 2012); and
- ✓ requiring a method for academics to translate research into a language understood by people and where communication is considered to be a key element of impact (Andy Tattersall, https//npjscilearningcommunity.nature.com).

5 W's (+1)	WRC TT 693 pilot project	WRC risk impact analysis project
***Who** has conducted this research, who will benefit from it and who has funded it?*	- An experienced service provider conducted the project - 12 WSAs in KZN and EC benefited - WRC and DST funded the project	- An independent specialist conducted the impact analysis - 8 WSAs in KZN and EC benefited - WRC funded the project
***What** has happened with this research? What was done to complete it, what processes were involved, what methods and what was the results and conclusion?*	- The participating municipalities were supported to develop risk-based plans and to develop technical skills to improve risk management and service delivery.	- The impact of the support project on the municipal risk management practices was analysed.
***Where** did this research take place, at which organisation/s and geographical location?*	- In KZN and EC at identified municipalities' drinking water and wastewater treatment plants.	- In KZN and EC at identified municipalities.

***When** did this take place, when did the project start and when did it finish?*	- The project started in 2014 and concluded in 2016.	- The impact analysis was done in 2018. The period under investigation was 2014-2016.
***Why** did this research happen? Why was there a need for it?*	- To support capacity constrained municipalities to develop risk plans and build human resources capacity, in order to improve risk management and service delivery.	- To measure the impact of the pilot project in the participating municipalities.
***How** did it happen, what was done to complete it, what processes were involved, what methods and what was the results and conclusion?*	- The need was identified to support municipalities in risk planning. - WRC and DST funded the deployment of a service provider who assisted municipalities in the use of risk-based methods and tools. - These tools included checklists, guidelines, on-site assessments, action plan drafting and training sessions.	- In the absence of the Blue/Green Drop audits, the WRC commissioned a project to analyse the impact of the pilot project on capacity building and water services delivery in municipalities. - Indicators were developed to measure the impact from a risk perspective. - Personal interviews and mock Green/Blue Drop assessments were done to collect the required data and determine impact. - The findings and learnings were used to formulate a framework for national roll-out.

1.5 STUDY OBJECTIVES

The study objectives are as following (each chapter of this report mirrors a particular objective):

No	Aim
1	To develop a framework or methodology to assess the impact of the intervention using innovative risk-based tools to assess knowledge and skills improvement;
2	Use the framework to assess water services risk management status quo within target DMs before capacity building intervention and use the Blue/Green Drop assessment approach to identify and establish the current improvements within DMs post-intervention, including a capacitated municipality (or a municipality which did not receive support) as reference;
3	To assess and identify any significant roll-out of water services risk management to other systems within the capacitated DMs, including measuring the extent of their integration into overall DMS core activities in support of sustainability;
4	To capture and document the lessons learnt by the 'capacitated' DMs, and assess these lessons' impact on national roll-out to other DMs;

5	To develop a national roll-out framework that takes into consideration the successes, failures, challenges and opportunities of the pilot study and make recommendations for modification of risk-based tools for improved uptake.

Chapter 1: Background and purpose of study

Chapter 2: Development of a framework for risk impact analysis, linked to the Blue/Green Drop approach

Chapter 3: Application of the framework to analyse the impact of risk-based capacity building

Chapter 4: Uptake and integration of risk management on institutional level

Chapter 5: Trends and comparison of study results

Chapter 6: Lessons learnt and its impact on national roll-out

Chapter 7: Development of a framework for national roll-out of risk-based capacity building

Chapter 8: Recommendations and further work.

1.6 METHODOLOGY

A five-step process was followed to meet the study objectives:

Objective 1: Develop a Framework for Risk-based impact assessment

- Obtain the insight of the Reference Group, Research Manager and pilot project Manager to inform the methodology for the continuation study.
- Study WRC Report TT 693, confirm the names and contact details of the participating persons within the municipalities.
- Develop an inventory of the key characteristics of each municipality.
- Select a capacitated municipality as 'reference' municipality.
- Extend a WRC letter of invitation to inform the municipalities of the purpose of the continuation study and to invite further participation.
- Develop a study framework to assess the impact of the risk-based capacity building in the target municipalities, by considering 2 key principles:
    1. Participating municipalities must derive benefit from the study;
    2. Selection of a suite of measurable parameters to determine the impact of the pilot project with reasonable accuracy.
- Conduct a background study to inform the development of an assessment methodology which would consider:
    - Definitions of risk management;
    - Best practices observed in the industry;
    - Identify and profile participating municipalities;

- Identify the key challenges and enablers experienced by municipalities to move forward along the risk management value chain – use capacitated- and capacity constraint comparisons to demonstrate the ''why's'', the area of impact on the user and the organisations, etc.;
- Cluster staff positions in terms of the most recent Organising Framework of Occupations (OFO), to cover a spectrum of positions involved in risk management in a typical municipal environment;
- Within the clusters, identify the job profiles that participated in the support project, e.g.
  - Technical: Process controllers, plant supervisors, district inspectors, laboratory technicians, maintenance staff, environmental and health practitioners
  - Financial: supply chain officer, budget control staff
  - Planners: IDP, WSDP, Departmental Heads, etc.
  - Political: Portfolio Head for Infrastructure, Water & Sanitation and Finances
  - Managers: Head of Department, Municipal Manager, CFOs,
  - Other Authorities: DWS, CMAs, etc.
- Develop assessment protocol and methods;
  - Outline possibilities to introduce a support project and the triggers to obtain or resist buy-in
  - Electronic assessment vs personal interviews
  - Communication of protocols and findings
  - Consideration of site specific vs replication parameters.
- Design a set of indicators to measure the impact of a capacity building initiative by considering the following principles;
  - Selection of indicators that is measurable
  - Data and information must be readily available
  - Indicators which have linkage/synergies to other programmes in the sector (i.e. the Blue/Green Drop audits)
  - Data that would allow the direct comparison of the *baseline* status (before implementation) and the *impacted* status of the municipalities (after implementation).
- The indicators to be informed from 4 potential sources;
  i. Green/Blue Drop 2013 results
  ii. Green/Blue Drop risk values from previous DWS PAT Reports
  iii. Pilot project TT 693 information, i.e. the W_2RAP and WSP
  iv. Independently conceptualised indicators that satisfy the project scope.
- The indicators need to consider at least two levels of complexity;
  - simplistic indicators to encourage participation and add value at municipal level
  - complex indicators to inform a national roll-out.

Objective 2: Conduct the Impact Assessment

- Use the framework to assess the status of risk management before- and after the pilot project.
- Use the Green/Blue Drop assessment approach to measure progress or digress, by applying the 2013 Green/Blue Drop criteria. Make relevant observations in terms of the recently published Green/Blue Drop requirements (DWS 10 year plan: 2015-2025).
- Organise findings in terms of 'capacitated municipalities' and 'capacity-constrained municipalities' in order to inform further analysis, recommendations and benchmarks where appropriate.

Objective 3: Assess the uptake and integration of risk management on institutional level

- Assess the integration and adoption of a risk-based approach within the broader municipal planning environment and institutional alignment, in order to determine if the capacity building initiative translated to a longer term sustainable approach.
- It is hypothesised that site-specific W_2RAP and WSP would have informed, included or integrated with:
  i. Integrated Risk Management Plan
  ii. Capital- and operational budgets or SDBIP
  iii. WSDP
  iv. Masterplans for water and sanitation
  v. Skills Development Plans
  vi. GDIP and BDIPs
  vii. Asset registers.

Objective 4: Capture lessons from capacitated municipalities

- Identify the lessons learnt from the capacitated municipalities and make interpretations to inform the roll-out of support projects to other municipalities in South Africa.
- Share high level findings with- and interview the WRC research team who conducted the support pilot project for their insights and further lessons learnt or reflections.
- Obtain input by the participating municipalities on the findings of the research, prior to publication of the final report.
- Share findings and obtain the insight of sector stakeholders (e.g. DWS, SALGA, SETA), as represented by the WRC Reference Group.

Objective 5: Develop a framework for national roll-out

- Provide a high level framework and make recommendations pertaining to a national roll-out of risk-based capacity building by considering:
  - the lessons learnt;
  - success and gaps of the pilot project;
  - challenges and opportunities within the SA sector context;
  - the Blue/Green Drop requirements (regulatory impact).
  - Consider local and global capacity development approaches, including the pilot project TT 693 (Review and Adaption through 4 phases – 1st Order assessment, Improvement phase, Implementation phase I, Implementation phase II, Review and close-out).
- Consider the key aspects when monitoring a support project in ensuring that the impact of risk-based interventions are optimised and sustainable in the longer term.
- Include any modifications to risk-based tools for improved uptake of the tools and the approach in the municipal sector.

Close-out:

- ✓ Detailed WRC Report
- ✓ WIN-SA Report.

2. DEVELOPMENT OF A FRAMEWORK FOR RISK IMPACT ANALYSIS, LINKED TO THE BLUE/GREEN DROP APPROACH

WRC Report TT 693 was a main source of input in conceptualising a suitable framework for conducting a risk impact analysis:

Table 1: Observations of pilot project TT 693 and potential impact on the risk-impact analysis study

#	Observation	Impact on risk impact analysis
1	No assessment or baseline determination was done to establish the risk status or human resource capacity of the municipalities at start of the support project.	A risk impact analysis requires a reliable and defined baseline which would serve as basis for future measurements.
2	Vulnerability studies were done at the start of the pilot project to illustrate the dynamics across the risk planning process, however, the reasons 'why' the gaps exist were not identified.	It is ideal to develop an impact analysis framework that addresses the root causes of impact.
3	The vulnerability studies were done upon commence of the pilot project, but not repeated thereafter. The impact of the project on the initial vulnerability indicators could therefore not be determined.	The consistent measurement against a set of pre-selected indicators is required if impact is to be tracked over time.
4	The vulnerability assessment was completed by the municipalities themselves, but not independently verified.	Municipalities may rate themselves fairly good or not, with some subjectivity being involved. A guided self-assessment or independent verification is advisable.
5	Terminology were not clearly defined at the onset of the project, which left uncertainty as to their meaning. For example, the word 'capacity' may refer to human capacity, infrastructure capacity, or social capacity (ability for a technical champion to present to Council).	Clarification of terminology is important to bring different parties on par regarding the meaning and use of terms during a support project, especially where different disciplines (social, technical, financial, etc.) are involved.
6	The primary goal of the support pilot project was to improve risk-based planning. Capacity building were seen to be a secondary goal and not the main theme of the research team's methodology.	A support project should ideally define capacity building as a primary output, and the methodology statement need to allow for measurement of impact of the support.
7	Project TT 693 was reliant on the Blue/Green Drop audits to determine the impact of the project. The key measurable was 'an improvement in service delivery of 60-65%'. With the breakdown in the national regulatory programme after 2014, the impact of the project could not be verified via independent means.	Quantifiable indicators need to be established prior to the start of a support project and need to define measurable parameters before- (=baseline) during-, upon immediate project close-out, as well as in the longer term, to ensure sustainable uptake of new knowledge and skills. (Typical indicators related to *service delivery* would include % of customers with access to sewer- or water supply system, number of water associated health outbreaks, etc.; or to *human resource capacity* would include number of skills development plans, compliance of staff to regulations, skills suitability per job specification, etc.).

Subsequently, the fundamental question that was derived from the above observations was:

- *How can the impact of the pilot project be best measured using a set of qualitative and quantitative criteria, given the absence of a defined baseline at the start- and close of the pilot project?*

This question was pivotal to the development of the continuation study, given the objective and hypothesis that:

- *Objective: to analyse the impact of the use of risk-based tools and capacity building in identified municipalities.*
- *Hypothesis = that the pilot support project would have a positive, sustainable and measureable impact on water services and risk management in the participating municipalities.*

2.1 SELECTION OF PRINCIPLES AND INDICATORS

Five key principles were selected to guide the design of the framework and its indicators:

i. The indicators must be measurable (quantitative and/or qualitative);
ii. Credible data and information must be available to support each indicator for the specific period assessed;
    - 2014: pre-TT 693 project
    - 2016: after support was provided through TT 693
    - 2018: current status
iii. The impact analysis must permit the direct comparison of the *baseline* status (before support) and the *impacted* status of the municipalities (after support), in order to track progress/digress during the period under assessment (2014-2018);
iv. The indicators used must preferably link with other programmes in the sector, i.e. the Blue/Green Drop audit results, to inform sector-wide replication initiatives;
v. The process and results from the continuation study must benefit and add value to the participating municipalities.

Guided by the above principles, information sources were considered that are already well embedded, applied and understood across the municipal water sector of South Africa. The following sources of information was subsequently considered for the development of a framework that would most accurately and scientifically assess the impact of Project TT 693:

2.1.1 BLUE / GREEN DROP KEY PERFORMANCE AREAS

The Blue Drop and Green Drop audit system is an incentive-based regulation system which comprise of a number of Key Performance Areas (KPA) that measure the performance of a municipal water treatment or wastewater treatment systems. The Regulator applies the rationale a municipality who comply with all these KPAs would have a well performing, compliant and sustainable water business with sufficient human and infrastructure capacity and capability. Broadly, the KPAs are summarised as:

1. Technical skills (operations, maintenance, management);
2. Water/effluent quality monitoring;
3. Reporting to the Regulator;
4. Water/effluent quality compliance with legal standards;

5. Risk management;
6. Local regulation (municipal bylaws);
7. Infrastructure capacity and planning;
8. Asset management (including OPEX and CAPEX).

Each municipal water or wastewater treatment system receives a corresponding Blue- or Green Drop score after the audit process, which reflect the status of the water/wastewater services in the particular municipality. Colour coded legends are used to describe the Drop score, with orange and red indicating an undesired state of water services, with green and blue indicating good to excellence in water services.

90-100% Excellent
80-<90% Good
50-<80% Average
30-<50% Poor
0-<30% Critical

2.1.2 NATIONAL BDRR AND CRR REPORTS

The Blue/Green Drop programme is supported by risk-based regulation, whereby risk scores are calculated and published annually in the Green/Blue Drop Reports and Green/Blue Progress Reports (PAT Reports). To date, risk scores were published from 2011-2014, with the 2017/18 scores currently being processed by DWS (not available for study). It is standard practice for municipalities to do an independent calculation of their BDRR and CRR risk scores as part of the WSPs and W_2RAPs. The following calculations apply:

Risk score for wastewater services:

Cumulative Risk Rating (CRR) = A x B + C

$$\text{CRR (\%)} = \frac{A \times B + C}{CRR_{max}} \times 100$$

Where:
A = Design Capacity of plant which also represent the hydraulic loading onto the receiving water body
B = Operational flow exceeding-, on- and below capacity
C = Number of non-compliance trends in terms of effluent quality as discharged to receiving water body
D = Compliance or non-compliance, i.e. technical skills (management, operation, maintenance).

Risk score for drinking water services:

Blue Drop Risk Ratio (BDRR) = 0.25A + 0.25B = 0.5C

$$\text{BDRR (\%)} = \frac{0.25A + 0.25B = 0.5C}{BDRR_{max}} \times 100$$

Where:
A = Treatment Capacity Risk Rating
= Annual Average Production (Operational) capacity RR X Population RR
B = Process Control Risk Rating [Reg. 813]
= Works RR X (Process Control RR + Supervisor RR + Maintenance RR)
C = Water Quality Compliance Risk Rating [SANS 241]
= Population RR X [(0.8(0.5 Micro + 0.2 Chemical + 0.3 Risk-informed)) + (0.2*(0.6 WSP + 0.2 Monitoring RR + 0.2 Full SANS))].*

Colour legends are used to depict the risk position, where orange and red coding represent a treatment facility in critical or poor state, and green or blue represent a low risk plant.

90-100% Critical risk
70-<90% High risk
50-<70% Medium risk
<50% Low risk

2.1.3 WATER SAFETY PLAN AND W_2RAP

The WSP and W_2RAP is a risk-based methodology which involves the use of a multi-disciplinary team who follows a specific pathway to develop, implement, monitor and review risk plans. A risk-based plan consist of a number of hazards and risks that are identified, scored, prioritised and subsequently used as basis to formulate mitigation measures for each risk, with a responsible person, timeframe and budget to address the risk over a short, medium or long term (Thompson & Majam, 2009; van der Merwe-Botha & Manus, 2011). WSPs and W_2RAPs are useful beyond their primary purpose as planning tools, as they also provide quantitative information regarding the number of risks per risk category and serve a monitoring tool to track the mitigation in risk, ideally from higher to lower risk positions. Capacitated municipalities use risk tracking to gauge their progress and to update their risk plans on a regular basis.

2.1.4 PROJECT TT 693 FINDINGS

According to WRC Report TT 693, a number of challenges remained at time of close-out of the pilot project, which needed to be addressed internally to effect further improvements in the risk management processes.

1. High turnover in staff;
2. Lack of qualified and sufficient number of staff;
3. Municipal managers, political heads and mayor not part of process;
4. Risk plans are not implemented;
5. No action plans or systems to track implementation;
6. Water quality info, loading an critical systems not in place;
7. Water quality data irregularities on GDS and BDS affect risk rating;
8. No energy management;
9. No sludge management; and
10. Unapproved manuals and documents.

These challenges informed the selection of qualitative indicators for use during the continuation study, as it would address in particular, the longer term sustainability aspects post 2016. The ‘root causes’ or reasons why these challenges occurred was not unpacked during the pilot project.

2.1.5 FINAL SELECTION OF RISK IMPACT INDICATORS

In light of the above, a framework was developed consisting of a number of indicators which comply with the mainstream criteria (i-v):

- Blue/Green Drop 2014 scores;
- National risk data, i.e. BDRR and CRR 2014 scores;
- Risk vulnerability assessment (RiskQ);
- Project TT 693 information, i.e. listed challenges from the W_2RAP and WSP processes and capacity building initiatives;
- Additional and newly conceptualised indicators that satisfy the continuation study objectives; and
- Observations made during personal interviews with the participating municipalities.

2.2 DESIGN OF A RISK IMPACT FRAMEWORK

Against the above background, an assessment framework were developed to meet the study objectives. Five key focus areas were selected:

1. ***Water Services Performance***: Any capacity building initiative and risk management process ultimately need to translate into improved water/effluent quality and water/wastewater services.

2. ***Risk management***: Risk management enables a municipality to identify, prioritise and address the risks to its water business and the health of the community and environment. A support initiative that assist to develop and implement risk mitigation should result in enhanced human capacity, optimised processes, prolonged asset useful life and improved service delivery.

3. ***Skills and capacity:*** Human competency is a determinative factor that underlies performance, compliance and sustainable service delivery. A successful support initiative should have a direct and measurable impact on skills, capacity and motivation of the participating municipal officials.

4. ***Infrastructure management***: The ability of the hardware to perform to its design specification is a critical measurable, and relates to the maintenance of the asset and budgets available in ensuring that the asset remain useful and fit for its purpose.

5. ***Business continuity and sustainability:*** Any and all support initiatives must translate into a positive long term impact and sustainable future of the municipal water services business.

Table 2: First order framework outline to conduct an impact analysis

#	Focus area	Indicator	What to measure	How to measure
1	Water Services Performance	Improved water services	Overall BD/GD score	% BD, % GD per plant, % per WSA
2	Risk management	Improved risk management	BD/GD risk score	% BD/GD risk score per plant / WSA
		Improved risk status	BDR/CRR score	% BDRR, % CRR per plant, % per WSA
		Reduced vulnerability to manage risk	RiskQ vulnerability assessment	8 key areas of risk management
		Success in addressing key challenges identified in 2016	Key challenges that remained after 2016 project	10 key challenges from 2016 recommendations
		Multi-disciplinary team involved in risk planning and mitigation	Number of disciplines involved (OFO)	# of disciplines
3	Skills and capacity	Improved knowledge to carry out risk-based planning	WSP and W_2RAP questionnaires	TT 693 20 questions for WSP/W_2RAP
		Improvement in skills and capacity	Technical skills; Internal capacity; Social capacity; Reliance on PSPs	BD/GD score; Registered technical staff; Use of WRC tools*; Submission of SDP at LGSETA; Capacity of technical champion to present to Council; Use of PSPs to do risk plans.

4	Infrastructure management	Improved capacity, planning and implementation	Available system capacity, plans, budgets	Design capacity, flow, budget trend
5	Business continuity and sustainability	Roll-out and integration of risk-based planning into other systems	Implementation, update and integration of risk plans	Implementation of Action Plans; Updated WSP/W_2RAPs; Signed WSP/W_2RAPs; plant-based IMPs; Integration in broader risk-based planning of municipality

The framework comprised of specific parameters that could be measured to offer results on different levels of complexity. The following sources were used to measure the selected indicators:

- *BD and GD scores 2014:* This published data was readily available from the Drop Reports and from the municipalities.
- *BD and GD score 2016-2018:* No Drop scores were available to track against the 2014 scores. A Blue Drop and *Green Drop Simulated Assessment Tool** was therefore used to conduct a (mock) BD/GD assessment during the interview sessions (Annexures F and G).

  ** The Simulated Tool was based on the new BD/GD criteria of DWS for 2015-2015 (WISA, 2014)*
  - Time did not allow for system-specific assessments, but the resultant overall BD/GD indicative score were regarded sufficient to allow for a comparison with the 2014 BD/GD scores,
  - The DMs were trained on use of the BD/GD tool and requested to complete system-specific assessments in their own time.
- *BDRR and CRR risk scores 2014*: This data was published and readily available from the Drop Reports and from the municipalities.
- *BDRR and CRR risk scores 2016-2018*: The PAT scores were not shared by DWS. These risk scores were subsequently obtained from the municipalities directly.
- *RiskQ checklist*: The RiskQ checklist were completed during the interviews with the DM teams. Spider diagrams were developed similar to those used in the TT 693 pilot project.
- *Capacity and Knowledge Questionnaire*: For the sake of continuity, the same questionnaire used during Project TT 693 was used to compare the 2016 and 2018 risk knowledge base of the municipal staff.
- *Technical skills*: The GDS and IRIS system of the DWS was used to determine the technical skills movement from 2016 to 2018.
  - The results were found to be inconclusive and were not used to measure skills.
- *Institutional perspectives*: Personal interviews were held with each participating municipality to complete the risk impact analysis.
- *OFO job position participation*: In order to satisfy the WRC Reference Group requirements to analyse and reference the municipal OFO codes and position titles, the following actions were taken:
  - The OFO framework with >1360 job titles were studied,
  - 190 positions were identified that would typically be involved in water services risk management in local government,
  - Attendance registers were used to analyse current positions versus OFO positions of the participating municipal officials.

Table 3 following represents the framework used to assess the impact of the pilot project on capacity building in the participating municipalities. The framework was shared with the participating DMs prior to their interviews to assist preparations. The framework consisted of different Schedules:

Schedule A represents the final framework, consisting of 5 key focus areas, 10 indicators to measure impact, 27 measurement units, supported by 3 timestamps (2014, 2016, 2018) to compare impact before-, immediately after- and 2 years after- the implementation of the pilot study. The comment boxes were used to capture specific reasons pertaining to 'why' the impact was positive/negative/unchanged over the 3 time stamps;

Schedules B and C represent the support questionnaire forms which support the completion of Table 3 Schedule A main framework;

Schedule D represents additional tools that were used to complete Schedule A main framework, i.e. RiskQ analysis, mock GD/BD assessment and Skills and Knowledge Survey used during the pilot study.

Table 3: Extended framework to analyse the impact of a pilot-scale risk-based capacity building project as pertaining to drinking water and wastewater services

IMPACT ASSESSMENT SCHEDULE A: **Quantitative analysis and comparison of risk impact from 2014 -2018 (Source as per Verification Reference):**

	Focus area	#	Indicator	#	Unit of Measure	Verification	2014	2016	2018	Comment
							Before support	After support	Impact	
1	Water Services Performance	1	Improved water services	1	WSA overall % BD/GD score	*BD/GD Report 2014*				
				2	% BD/GD per plant	*BD/GD Report 2014*				
2	Risk management	2	Improved risk management	3	WSA % BD/GD score for WSP/W_2RAP criteria	*BD/GD Report 2014*				
				4	% BD/GD per plant	*BD/GD Report 2014*				
		3	Improved risk status	5	% BDRR, % CRR % per WSA	*BD/GD PAT*				
				6	% BDRR, % CRR % per plant	*BD/GD PAT*				
		4	Reduced vulnerability to manage risk	7	RiskQ vulnerability assessment – 8 health attributes as % in WSA	*TT 693 RiskQ tool*				
		5	Success in addressing key challenges identified in 2016	8	# of 10 key challenges addressed after 2016 project*	*TT 693*				
		6	Multi-disciplinary team involved in risk planning and mitigation	9	# of disciplines involved in risk management**	*OFO checklist, new BD/GD criteria*				
3	Skills and capacity	7	Improved knowledge to carry out risk-based planning	10	% positive responses from WSP/W_2RAP questionnaires (20 questions each)	*TT 693*				
		8	Improvement in skills and capacity	11	% BD/GD technical skills criteria score	*BD/GD report*				
				12	# of technical skills complying to Reg. 2834	*IRIS/GDS*				
				13	# of registered technical skills	*IRIS/GDS*				
				14	Internal capacity – submission of SDP to LGSETA (yes/no)	*LGSETA*				
				15	Internal capacity – # of staff receiving risk-based training***	*Interview TT 693*				

				16	# of risk-based tools and guidelines being used	*TT 693*				
				17	Social capacity – capacity of technical champion to present to Council (yes/partial/no)	*TT 693*				
				18	Reliance on PSPs to do risk planning (yes/partial/no)	*TT 693*				
4	Infrastructure management	9	Improved capacity, planning and implementation	19	Available system capacity (ML/d)	*BD/GD PAT*				
				20	Operational flow as % of design capacity	*BD/GD PAT*				
				21	% increase in OPEX budget	*BD/GD PATs*				
				22	% increase in CAPEX budget	*BD/GD PAT*				
5	Business continuity and sustainability	10	Roll-out and integration of risk-based planning into other systems	23	Implementation of risk-based Action Plans (yes/partial/no)	*TT 693*				
				24	Updated WSP/W_2RAPs with version control (yes/no – dated)	*TT 693*				
				25	Signed WSP/W_2RAPs (yes/no)	*TT 693* *BD/GD scorecards*				
				26	Plant-based IMPs to support WSP/W_2RAP (yes/no)	*Interview*				
				27	Integration in broader risk-based planning of municipality – # of plans receiving input from WSP/W_2RAP****	*TT 693* *GDBD/GD PAT* *Interview*				

** The 10 Challenges Questions (Schedule B)*
*** OFO LGSETA reference (2018)*
**** include internal, credible and accredited training or knowledge transfer initiatives*
***** IDP, WSDP, Asset Register, Asset Management Strategy, Integrated Risk Plan, Master plans, GDIP, Skills development plans, et al.*

IMPACT ASSESSMENT SCHEDULE B: ***Qualitative analysis of 10 Key Challenges from Pilot Study for 2014-2018 (Source: interviews)***

Complete 2016 and 2018 by indicating: **SAME** as 2014; **DIGRESS** from 2014; **MINOR IMPROVEMENT** from 2014; **MAYOR IMPROVEMENT** from 2014; **DO NOT KNOW**)

#	Challenge	2014	2016	2018	Comment by DM on WHY this challenge occur?
1	High turnover in staff	High			
2	Lack of qualified and sufficient number of staff	High			
3	Municipal managers, political heads and mayor not part of process	High			
4	Risk plans are not implemented	High			
5	No action plans or systems to track implementation	High			
6	Water quality info, loading an critical systems not in place	High			
7	Water quality data irregularities on GDS and BDS affect risk rating	High			
8	No energy management	High			
9	No sludge management	High			
10	Unapproved manuals and documents	High			

IMPACT ASSESSMENT SCHEDULE C: Reflection and Insight Questions ***(Source: interviews)***

#	Question	Insight / suggestion by municipality
1	Is risk management considered as an important driver of performance and services delivery in the municipality?	
2	What is the coverage of positions involved in risk management (e.g. from PC to MM level)?	
3	Why would you think the Indicative Trend is improving / digressing over the time under assessment?	
4	Was the TT 693 project valuable or not quite meeting your expectations? What can be done to improve it?	
5	What can sector partners do to support in capacity building and risk management progression?	
6	Is the impact of risk considered to be mainly internal to the organisation, or does it extend to the end user, general public, et al.?	
7	Is this risk perceived to be an economic, financial, social, environmental or human health risk, or combination thereof?	
8	What are the main challenges experienced in rolling out risk management in your municipality?	
9	What are the main successes experienced in rolling out risk management in your municipality?	
10	Do you have recommendations for the improvement of risk-based capacity support projects on a national scale? What do you think such a model looks like?	
11	Mention existing or past initiatives or models that you preferred and that had high impact?	

IMPACT ASSESSMENT SCHEDULE D: Additional assessment to support Schedule A: *(Source: interviews)*

D1: Vulnerability assessment: Water Risk Planning (RiskQ)
D2: Vulnerability assessment: Wastewater Risk Planning (RiskQ)
D3: Blue Drop mock assessment
D4: Green Drop mock assessment
D5: Monitoring of 2018 Knowledge Status on Water Safety Planning (WSP)
D5: Monitoring of 2018 Knowledge Status on Wastewater Risk Abatement Planning (W_2RAP).

ANNEXURES:

A: Guideline to DMs to prepare for meeting
B: RiskQ analysis
C: Knowledge and skills transfer questionnaire
D: Attendance register format (with OFO reference)
E: Blue Drop scorecard
F: Green Drop scorecard
E: OFO job titles selection (current and proposed positions).

3. APPLICATION OF THE FRAMEWORK TO ANALYSE THE IMPACT OF RISK-BASED CAPACITY BUILDING

WRC letters were issued to all DM Water Services Managers to invite their participation in the study (Annexure A). In response to 15 WRC invitations, 8 municipalities accepted within 10 days from the invite. Follow-up calls to the remainder 5 municipalities did not yield results and were not pursued further. The selection of 8 municipalities (53% of the targeted participants) were regarded as an adequate representation for a scientifically correct impact analysis. The participating municipalities included: Amathole, Chris Hani, Joe Gqabi, Amajuba, Harry Gwala, uMzinyathi, uThukela and Zululand.

Amathole DM was selected as the reference municipality for the following reasons:

- The DM was not part of the capacity building pilot study, as they indicated that they are capacitated in terms of their risk management plans, processes and systems, as well as internal skills to execute risk management;
- The DM was commended by the Regulator for the sterling work on their risk management planning and implementation, which placed the DM in a leadership position with regard to risk-based management of water services in South Africa (DWS Green Drop Report 2013).

3.1 CASE STUDY 1: EASTERN CAPE – JOE GQABI DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for all 10 drinking water systems (dated 2013) and W_2RAPs for all 16 wastewater systems in place (dated 2013). The DM indicated that they needed support in terms of tracking of implementation progress, review of risk plans, as well as verification of control measure and setting o performance targets. Support was subsequently provided under Project TT 693 in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Workshop on the processes involved in risk management.

2018 status of WSP and W_2RAP

The 2013 WSP and W_2RAPs were the last documents developed, followed by Action Plans done during the pilot project in 2015. Since 2016, risk assessments were done annually, the last being in June 2018. The BD and GD audits by DWS served as incentive to follow a risk-based approach, compounded by the baby death saga that triggered vigilant actions pertaining to water quality and risk management.

The risk assessments are supported by monthly and annual analysis of flow and quality. Standard Operating Procedures (SOP) were developed for risk assessment and management processes, in accordance with the WRC Guidelines. Although funding is available to support the implementation of risk plans, the plans are not signed off by senior management.

Risk management was set back when DWS delayed on the implementation of the Blue/Green Drop audits from 2014 onwards. Prior to 2014, the Municipal Manager had performance targets in place pertaining to

water and wastewater performance, and resources were availed to embed GD and BD in the organisational systems. Currently, no continuation takes place and no incentive is presented for good performance. However, municipal management purportedly prioritises risk management of water services. The focus is predominantly on final drinking water- and effluent quality compliance, with monitoring occurring on a monthly basis. The DM retains a high readiness level to participate in BD/GD audits, if/when DWS proceeds with audits in the future. The current Manager's performance agreement has water quality as only target (no wastewater targets), and diligently report and perform against this target.

The WSP and W_2RAP risk team consists of water quality technicians, environmental health professionals (EHP), the WSA manager and Area Manager. Risk-based planning and mitigation involved the technical personnel only, with no participation by political principles or other departments.

Strengths

- A small focussed technical team, linked via WhatsApp networking to respond to incidents in the field;
- An enabling environment with high allegiance amongst the team members;
- A defined Champion is present who drive risk management through a hands-on approach, with a supportive Water Quality Manager;
- SANS-based risk management as specific element of the WSP improved water quality from 93% to 96.5% over the last 3 years;
- NQF levels 1-4 training.

Challenges in rolling out risk-based plans

- Low staff retention and weak attraction of water professionals to Joe Gqabi, with the DM being a small rural municipality with perceived limited opportunities;
- Resources are not readily available to implement integrated risk management;
- Different understanding amongst officials of the terminology, processes and purpose of risk management – a common understanding is essential. Example: the DM's Risk Committee' reports have a column named: "Residual Risk and Movement of Risk". These terminologies need to be uniform so that a universal approach and reporting can be followed;
- Lack of buy-in by role players, low awareness as to the importance of risk management in water services.

Reflection on WRC capacity development project

The team responded positively to the support project of 2015 and highlighted the following impressions:

- Prior to the project, the team was well aware of the requirements and concept of risk management, however, the pilot project assisted to clarify the technology and processes involved in risk management;
- Using Ulundi WSP as rural scheme, the project assisted the DM team to link theory with practice. The workshop was interactive and assisted the risk teams to apply the WSP and W_2RAPs;
- The training assisted the team to understand and use the risk matrix, identify CCPs, etc.;

- The workshop format was effective. The WRC team worked through risk processes with the DM team, then allowed the team to report back their own findings. This facilitated process promoted ownership and buy-in.

Results of the risk-impact analysis framework

Table 4: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for Joe Gqabi DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	74.7% (Fare)	NI	74%* (Fare)	~	*Improvement in all 6 BD criteria.*
	2	Green Drop score	49.9% (Very poor)	NI	52%* (Fare)	↑	*Improve in O&M, technical skills, and effluent compliance*
Risk Management	3	BD WSP score	23% (Critical)	NI	70%* (Good)	↑	-
	4	GD W_2RAP score	72% (Fare)	NI	55%* (Fare)	↓	-
	5	BDRR score	38% (low risk)	NI	NI	~	-
	6	GD CRR score	59% (med risk)	NI	52% (med risk)	↑	-
	7	WSP overall vulnerability	Highly vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	8	W_2RAP overall vulnerability	Highly vulnerable	NI	Highly vulnerable	~	*See spider below*
	9	# of disciplines involved in risk planning	Technical	Technical	Technical	~	*Technical team drives process*
Skills and capacity	10	Understanding of WSP risk process	Average	Good	Good	↑	*See Knowledge Survey results – 3 questionnaires*
	11	Understanding of W_2RAP risk process	Average	Good	Good	↑	*See Knowledge Survey results – 3 questionnaires*
	12	BD Technical Skills score	6%	NI	83%	↑	*Training and R.2834 registration process successful*
	13	GD Technical Skills score	46%	NI	71%	↑	*Training and R.2834 registration process successful*
	14	Submission of SDP to LGSETA	Yes	NI	Yes	↑	*Need 52 PCs. Budget limited to meet numbers. NQF1-4 achieved for 20-30 PCs*
	15	Internal capacity – # of events on risk-based training	Many	1 (WRC)	0	↓	*No LG training events since WRC TT 693*
	16	WRC tools used	Partial	Yes	Yes	↑	*Find tools useful, but limited time/people to learn and apply*
	17	Reliance on PSP to do risk 24)planning	No	No	No	~	*Can do essentials in house, but need specialist for some aspects – will assist to save time and move priorities*
Infrastructure management	18	Increase in OPEX	Baseline	Increase	Increase	↑	*Incremental increase annually – 10% inflation related*
	19	Increase in CAPEX	Baseline	Increase	Increase	↑	*Incremental increase annually*

Business continuity and sustainability	20	Implementation of risk-based plans	Partial	Partial	Partial	~	*No detailed risk plan to implement*
	21	Signed WSP and W_2RAP	No	No	No	~	*Council and Manco not signing off*
	22	Plant-based IMP	No	No	Generic	~	*Not plant based, not signed*
	23	Integration into broader risk-based plans	No	NI	No	↓	*Not a municipal priority, no incentive since discontinuance of BD/GD. Input invited from other Dept monthly – no response*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	2/10 improved	~	*Improvement = water qualify and systems info and water quality irregularities impact on BDS/GDS*

** Indicative Score based on a generic plant assessment, without verification of evidence*

The results of the collective Risk Indicators showed predominantly a ***positive trend***, with 50% of the indicators improving and 37% remaining constant. Only 13% of the risk indicators digressed over the period 2014 to 2018.

Improvement	↑	**12**	**50%**
Digress	↓	**3**	**13%**
Unchanged	~	**9**	**37%**

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: The 2014 and 2018 risk vulnerability profiles are very similar. The main exception is the improvement in risk assessment (3) and documentation and communication (7) during 2018.

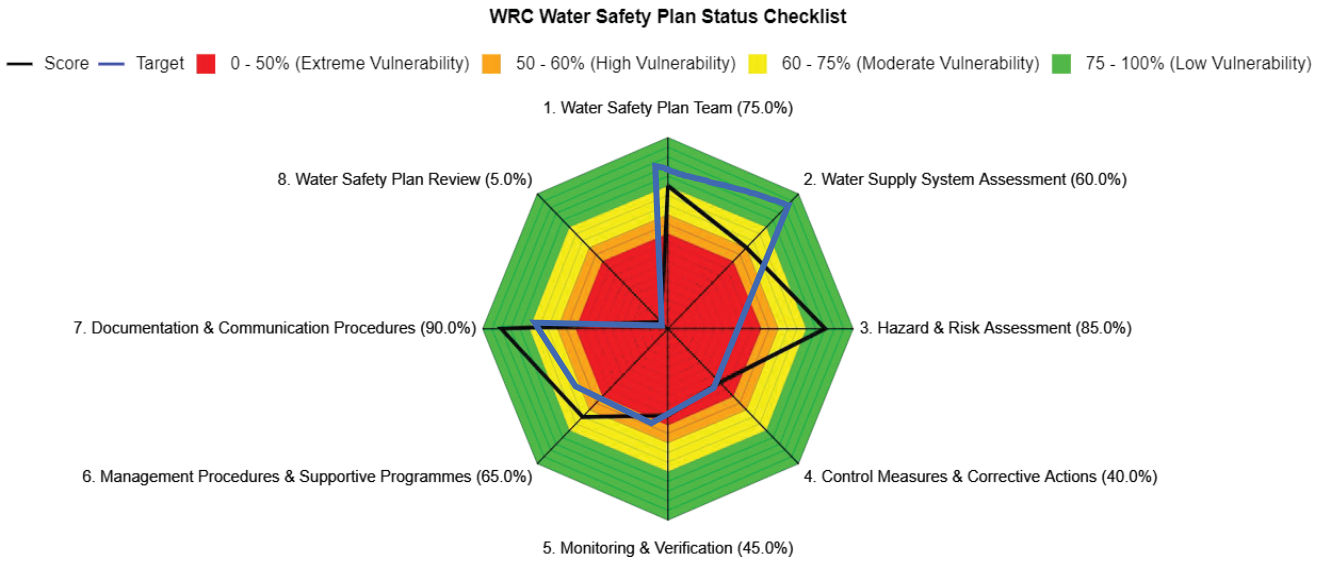


*Figure 1: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Joe Gqabi DM:*

W$_2$RAP: The risk vulnerability assessment for the W$_2$RAP in 2014 indicates a high vulnerability in the areas of risk plan review and record of completion (1 & 9). The same vulnerability, but more intense risk, is found in 2018. Areas that is less vulnerable compared to the 2014 assessment, are management and support (7) and documentation and communication (8). Overall, the DM's risk vulnerability has remained the same from 2014 to 2018, although a different risk category emphasis is noticed.

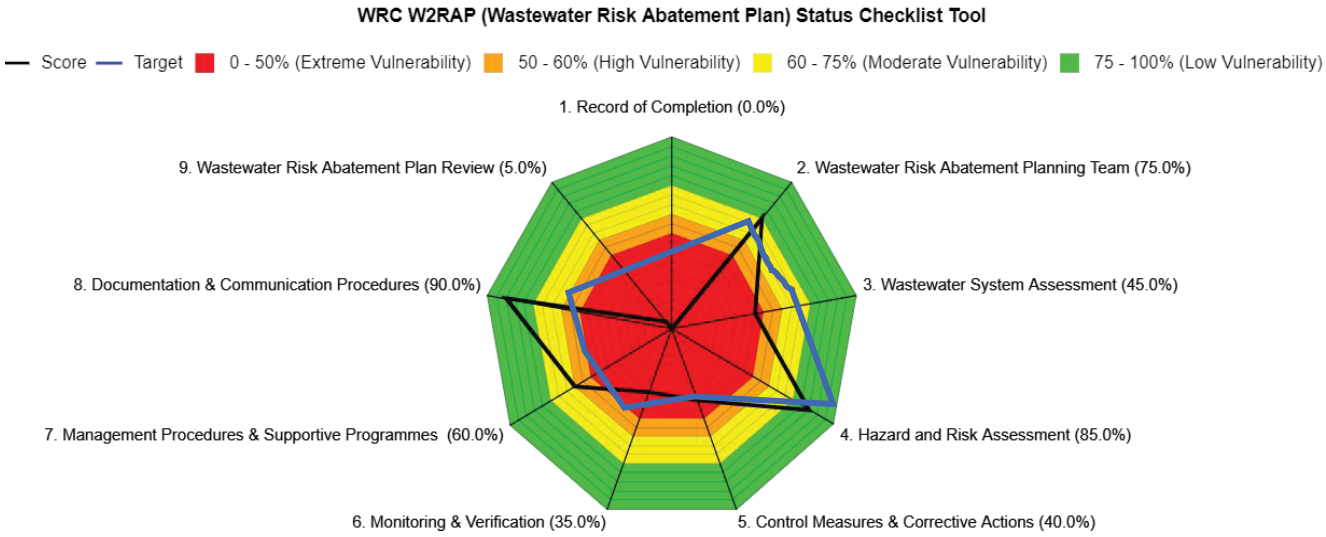


*Figure 2: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Joe Gqabi DM*

DM's recommendations to improve on risk-based capacity building initiatives:

i. DWS to re-introduce the BD and GD audit programme;
ii. More lesson sharing events and documentation that focus on the theme: "What are other municipalities doing to address similar problems";
iii. Follow-up on implementation progress annually, supported by specialists in the field;
iv. Induction training to Councillors by SALGA to have a strong water quality and risk focus, to ensure a good understanding of the process of risk management and the consequences if risks are not prioritised and monitored;
v. WRC tools and reports are valuable, but could be supported by workshops to better understand and apply them in the workplace;
vi. A stronger role and/or return of technical assistance or response units (e.g. RRU and TAC) in assisting DMs to implement risk mitigation measures and track risk progress.

3.2 CASE STUDY 2: EASTERN CAPE – CHRIS HANI DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for all 22 drinking water systems (2012) and no W$_2$RAPs for the 16 wastewater systems. A consulting firm was used to prepare the plans. The DM indicated that they needed support on both types of risk planning, specifically pertaining to development of protocol and communication procedures, as well as review plans and tracking of implementation progress. Support was provided under the pilot project in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Workshop on the processes involved in risk management;

- ✓ (No WSP or W_2RAPs were developed).

2018 status of WSP and W_2RAP

The DM confirmed that WSP and W_2RAPs were in place for all systems by 2014, with the support of consultants. An internal effort was made to update the plans in 2015/16 and 2016/17. The WRC TT 693 project was instrumental in building confidence and capacity within the DM to conduct these assessments in-house.

The DM WSP and W_2RAP teams consist of technical persons only, which include water quality, process and environmental health officials. The internal risk processes are driven by Champions who do not necessarily have the clout or influence to implement or make decision. With the exception of the WSA Manager, senior management does not play a role in any part of the risk identification, management or communication process. Unlike the IDP which is an institutional document, the WSP and W_2RAP plans do not inform or support organisational plans or priorities.

Although excellent Blue Drop scores were achieved by the DM in 2012, little to no acknowledgement was reportedly bestowed by DM leadership. The technical team holds the opinion that risk management have been set back when DWS deferred on the implementation of the Blue/Green Drop audits from 2014. The DM is however, still participating in the DWS annual PAT reviews, as input to their annual review processes, but have not yet received results back from DWS at time of study closeout.

Strengths

- A high number of individuals attended and participated actively during the interview session, with expertise from diverse technical and scientific fields;
- Several Champions take responsibility for their treatment plants and who value knowledge shared and performance reviews to aid in their continued improvement;
- Internal confidence and capacity to conduct site based risk assessment and update risk plans;
- Compliance with the DWS Blue/Green Drop risk management criteria;
- Availability of historic data and information;
- Operational procedures established with defined roles amongst the operations, water quality technicians and EHPs, with the latter having a verification role.

Challenges in rolling out risk-based plans

- Lack of senior management and Councillor involvement in water services risk management;
- Lack of involvement and input by financial, legal, political persons in the risk processes, resulting in lack of decision making and prioritisation of critical risks;
- Lack of funding to implement WSP and W_2RAPs;
- Lack of investment in human capital to develop capacity in water services;
- Unsigned WSDP, et al. – these serve before the relevant committees but remain unsigned;
- Organisational bias towards water quality, less attention to wastewater, as is evident from the fact that funds are allocated to mitigate low risk drinking water issues, but not high risk wastewater issues;

- Lack in the use of historic data to inform forward planning and risks analysis;
- Verbal procedures are not reduced to writing and documentation of risks, operations and management procedures;
- Lack of social capacity by technical ground level staff to successfully influence decision makers;
- 2019 elections will focus on immediate and visual priorities without consideration of clinical risk factors;
- Increased housing development, constraints by drought and over-abstraction of dams, aging infrastructure, et al. are risks which does not seem to inform higher planning imperatives in the municipality;
- Lack in interacting and communication between peers in different job positions does not contribute to a coherent team who share common objectives.

Reflection on WRC capacity development project

The team responded positively to the support project of 2015 and highlighted the following impressions:

- Prior to the project, risk planning was done by consultants. This has changed with the in-house team doing the same work to an improved standard.

Results of the risk-impact analysis framework

Table 5: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for Chris Hani DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	83.2% (Good)	NI	67%* (Fare)	↓	*Attention needed in WUE criterion*
	2	Green Drop score	51.6% (Fare)	NI	48%* (Very poor)	↓	*Best improvement in W_2RAP criterion, digress in Management Criterion*
Risk Management	3	BD WSP score	30% (Critical)	NI	80%* (Good)	↑	-
	4	GD W_2RAP score	37% (Very poor)	NI	70%* (Fare)	↑	-
	5	BDRR score	44% (med risk)	NI	NI	~	-
	6	GD CRR score	60% (med risk)	NI	NI	~	-
	7	WSP overall vulnerability	Extremely vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	8	W_2RAP overall vulnerability	Extremely vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	9	# of disciplines involved in risk planning	Technical	Technical	Technical	~	*Technical team drives process, lack of management*
Skills and capacity	10	Understanding of WSP risk process	Average	Good	Good to Partial	↓	*See Knowledge Survey results – 10 questionnaires*
	11	Understanding of W_2RAP risk process	Average	Good	Good to Partial	↓	*See Knowledge Survey results – 10 questionnaires*
	12	BD Technical Skills score	12%	NI	67%	↑	*Training and R.2834 registration required*
	13	GD Technical Skills score	66%	NI	58%	↓	*Training and R.2834 registration required*
	14	Submission of SDP to LGSETA	NI	NI	NI	~	*PC programme in place. No information.*
	15	Internal capacity – # of events on risk-based training	Yes (DWS)	1 (WRC)	0	↓	*No training events since WRC TT 693*
	16	WRC tools used	Yes	Yes	No to Partial	↓	*Find tools useful to prioritise risks, but limited implementation*
	17	Reliance on PSP to do risk planning	Yes	No	No	~	*Can do risk-based planning internal, need experts only for specific elements*
Infrasructure management	18	Increase in OPEX	Baseline	Increase	Decrease	↓	*R68m of R200m received*

	19	Increase in CAPEX	Baseline	Increase	Decrease	↓	*Receive low % of overall budget – not sufficient to address aging infrastructure*
Business continuity and sustainability	20	Implementation of risk-based plans	NI	NI	Partial	~	*Budget limitations*
	21	Signed WSP and W_2RAP	No	No	No	~	*No platform to influence senior management or Council*
	22	Plant-based IMP	NI	NI	Yes	~	*Plant based and regional IMP*
	23	Integration into broader risk-based plans	NI	NI	No	~	*Inform institutional IMP*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	2/10 improved	~	*Improvement = action plans and tracking and GDS/BDS data credibility*

** Indicative Score based on a generic plant assessment, without verification of evidence*

The results of the collective Risk Indicators show a ***negative to neutral trend***, with only 21% of the indicators improving, 38% digressing and 42% remain unchanged over the period 2014 to 2018. Digress is predominant in the KPA of Water Services Performance and Infrastructure Management.

Improvement	↑	**5**	**21%**
Digress	↓	**9**	**38%**
Unchanged	~	**10**	**42%**

<u>Risk vulnerability comparison: 2014 vs 2018</u>

Water Safety Plan: The 2014 and 2018 risk vulnerability profiles shows some similar patterns, with lesser vulnerability in 2018 compared to 2014. The area most vulnerable across both years is the review of the risk process (8). The best risk resilience is noted in the 1st 4 aspects, i.e. the team (1), the system and risk assessments (2,3) and the setting of control measures (4).

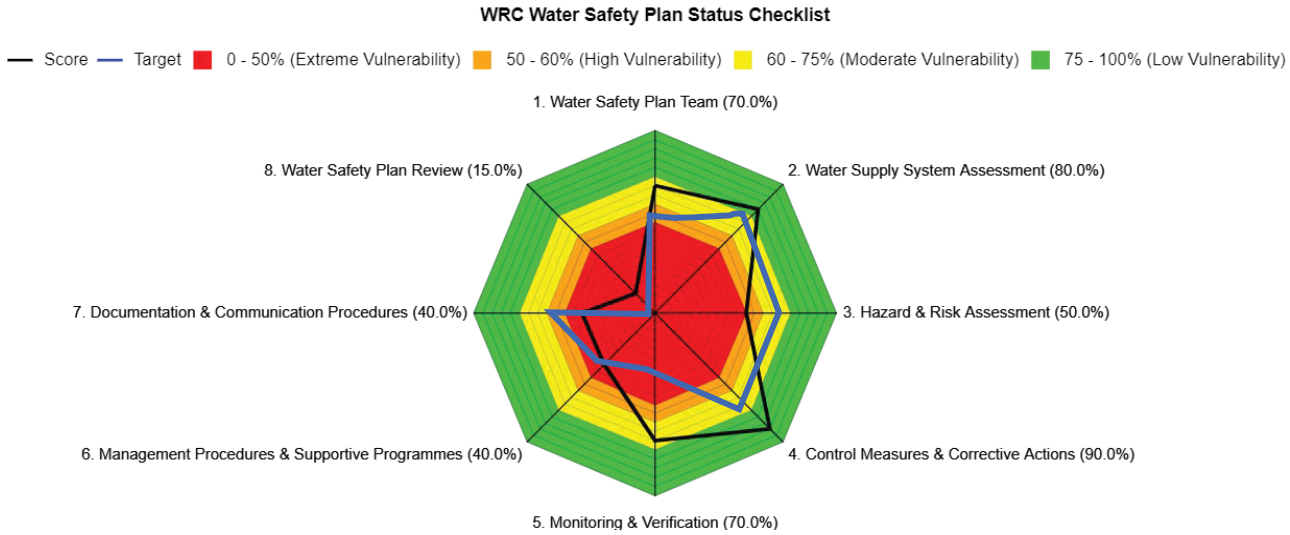


*Figure 3: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Chris Hani DM*

W$_2$RAP: The risk vulnerability assessment for the W$_2$RAP in 2014 showed extreme vulnerability in all areas of implementation, including management procedures (6), documentation and communication (7), review (8) and record of completion (1). The 2018 profile indicate a lesser vulnerability compared to 2014, however extreme vulnerability are still observed the areas of documentation and communication procedures (8), risk plan review (9) and record of completion (1).

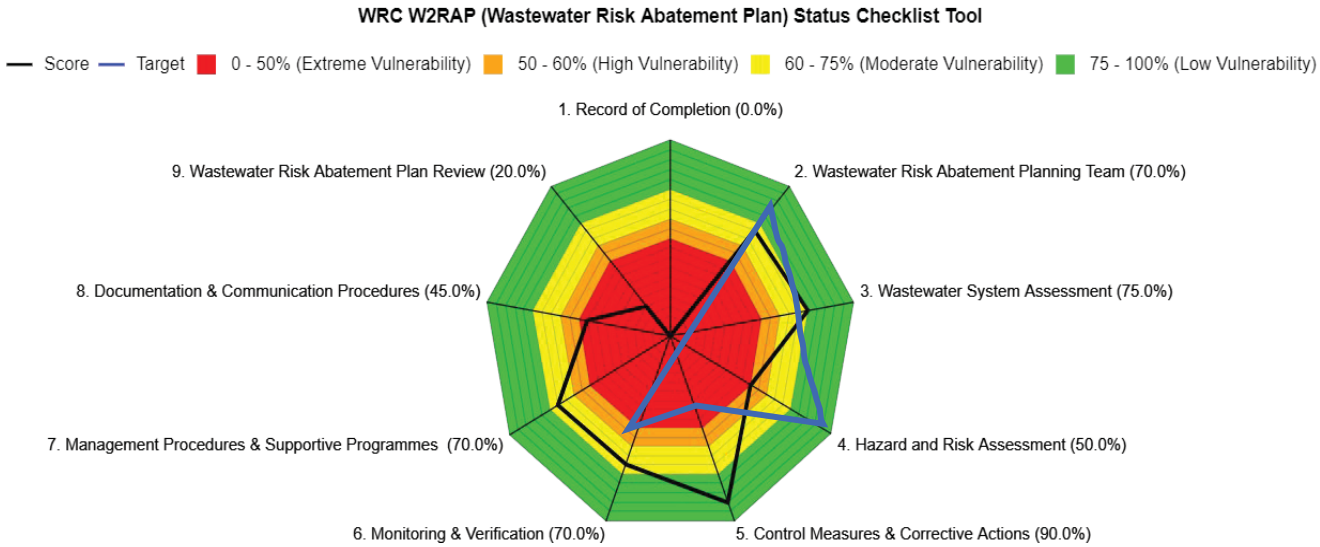


*Figure 4: Wastewater Risk Abatement Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Chris Hani DM*

DM's recommendations to improve on risk-based capacity building initiatives:

i. DWS to bring back the Blue/Green Drop audits, as it provided valuable information and assisted the DM to track progress and performance, and to maximise resource allocation to important matters;
ii. Clarify the roles of the sector departments, as the DM is uncertain what support or capacity development is on offer by the various partners;
iii. Assistance to raise importance of risk on organisation level – training to Councillors;
iv. Assistance with the incorporation of risk, as they happen, into the WSP and W$_2$RAP;
v. Facilitate ingress of new knowledge into the DMs via experts;
vi. Training on use of tools, e.g. MISA RiskQ tool gives a picture of the DMs water services business. Tools assist the DM to prioritise.

3.3 CASE STUDY 3: KZN – ZULULAND DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for 36 of 36 drinking water systems (2011/12) and W$_2$RAPs for 10 of 14 wastewater systems (undated). The DM indicated that they needed support on WSP and W$_2$RAPs, specifically pertaining to identification of control measures and W$_2$RAP implementation. Support was provided under Project TT 693 in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Development of WSPs for Ulundi and Upongolo drinking water systems;

- ✓ Development of W_2RAPs for Nongoma wastewater system;
- ✓ Workshop on the processes involved in risk management.

2018 status of WSP and W_2RAP

The DM confirmed that 34 water treatment facilities and 12 wastewater plants are existing, but that no further work was done subsequent to Project TT 693 in terms of WSP and W_2RAP development or updates, or the implementation of the draft Action Plans. Two WSPs were developed, but not completed, during the WRC Project TT 693.

Prior to 2014, at the time when DWS BD/GD audits took place, risk assessments were done annually and risk matrixes completed. DWS actively took part in quarterly meeting and provided input to the internal risk findings at DM level. The risk processes included management at highest level (Head of Departments) and Process Controllers and general assistants at ground level. This practice discontinued with the halt in the national BD/GD audit program.

With the breakdown of the BD/GD audits in 2014, combined with the more recent political changes in the DM, risk assessments are taking place intermittently. The last risk matrixes for WSP are dated August 2015 and for W_2RAPs dated 2017. Another risk update is planned for 2018. IMPs were also developed to support the risk plans. The risk assessments are done by the technical team and WSSA as services provider. WSSA is currently appointed in a 3rd cycle of 3 years per cycle. An IT specialist is part of the team and provide support on data management. A risk register is maintained with inherent risks listed, which consider risk and safety planning aspects that is submitted monthly by WSSA. Signature space for the Portfolio Head's approval is provided, but the plans remain unsigned. The Municipal Manager was previously involved in approval and the Mayor facilitated discussion during EXCO meetings. Currently, two MMs have been acting in 5 months, which disturbed the usual business processes.

Strengths

- Involvement of the Internal Auditor in risk management and queries, as prompted by the Auditor-General;
- Strong coherent team between the DM and WSSA as service provider, with sufficient expertise and champions to drive priorities;
- Good IT and data management support by an external specialist who displays good knowledge of the institution, its challenges and strengths.

Challenges in rolling out risk-based plans

- Bills are send out in towns only and revenue collection is not optimised, especially in the rural areas (approx. 7% of DM). This prompted policies such as the replacement of standpipes with yard connections, etc.;
- Good planning framework, however, the priorities are politically motivated, not risk-based;
- Political instability impacts on risk-based planning and execution of water services;
- The technical team often participate and impart information on water and wastewater, but does not see the outputs from these processes (e.g. WRC project, asset register development, etc.). Such information is important to inform a comprehensive risk picture for water services.

Reflection on WRC capacity development project

The team's response to the WRC support project of 2015 was reserved:

- The two Water Safety Plans and Action Plans were not completed and handed over. The DM procured the services of another consultant to complete part of the work;
    - *Note: subsequent interview with the pilot project team reflected that no further information was forthcoming from the DM to finalise the plans*
- The Action Plans was provided in one document with different sections/chapters on each system. This format was not optimal for the DM's purposes;
- The DWS BD/GD Drop audits were the primary driver on aspects that resulted in improvement (e.g. Process Controller capacity building, etc.), not so much as result of the TT 693 project.

Results of the risk-impact analysis framework

Table 6: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for Zululand DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	51.2% (Fare)	NI	56%* (Fare)	↑	*Improvement in all 6 BD criteria*
	2	Green Drop score	23% (Very poor)	NI	52%* (Fare)	↑	*Improve in technical skills and effluent compliance*
Risk Management	3	BD WSP score	20% (Critical)	NI	65%* (Fare)	↑	-
	4	GD W_2RAP score	50% (Fare)	NI	50%* (Fare)	~	-
	5	BDRR score	58% (med risk)	NI	NI	~	-
	6	GD CRR score	70.3% (high risk)	NI	55% (med risk)	↑	-
	7	WSP overall vulnerability	Highly vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	8	W_2RAP overall vulnerability	Highly vulnerable	NI	High-extreme vulnerable	↓	*See spider below*
	9	# of disciplines involved in risk planning	Technical and Management	Technical	Technical	↓	*Technical team drives process*
Skills and capacity	10	Understanding of WSP risk process	NI	Good	Partial to good	↓	*See Knowledge Survey results – 4 questionnaires*
	11	Understanding of W_2RAP risk process	NI	Good	Partial to good	↓	*See Knowledge Survey results – 4 questionnaires*
	12	BD Technical Skills score	5%	NI	75%	↑	*WSSA has registered PC and sups*
	13	GD Technical Skills score	56%	NI	100%	↑	*WSSA has registered PC and sups*
	14	Submission of SDP to LGSETA	Yes	NI	Yes	~	*Annual skills audit, 15 work place learner plumbers, 30 Rand Water agents' intake, LGSETA, SACAP, DWS, MISA, NT support. PCs to NQF2, sups to NQF4.*
	15	Internal capacity – # of events on risk-based training	NI	1 (WRC) 1 (PSP)	Undetermined	↓	*Limited information. Awareness raining events with Councillors, supported by CoGTA*
	16	WRC tools used	No	Partial	Yes	↑	*Make use of W_2RAP, WSP, risk tools, SANS 241, etc.*
	17	Reliance on PSP to do risk planning	Yes	Yes	Yes	~	*Find value in external specialists, e.g. Process Audits*
Infrastructure management	18	Increase in OPEX	Baseline	Decreased	Decreased	↓	*10% decrease over 2 year period*
	19	Increase in CAPEX	Baseline	Same	Same	~	*Incremental increase 5-7% of budget*

Business continuity and sustainability	20	Implementation of risk-based plans	Partial	Partial	Partial	~	*Implementation as part of daily tasks, not specific to risk plan*
	21	Signed WSP and W_2RAP	No	No	No	~	*Only WSDP signed, but not specifically informed by risk plans*
	22	Plant-based IMP	No	No	Generic	~	*Not plant based, not signed*
	23	Integration into broader risk-based plans	No	NI	No	~	*Do not inform WSDP, etc. No monitoring of risk.*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	3/10 improved	~	*Improvement = qualified and # of staff, water qualify info, approved WSDP*

** Indicative Score based on a generic plant assessment, without verification of evidence*

The collective result of Risk Indicators shows a ***neutral to positive trend***, with 33% of the indicators showing improvement, 42% remain unchanged and 24% decline over the period 2014 to 2018.

Improvement	↑	**8**	**33%**
Digress	↓	**6**	**24%**
Unchanged	~	**10**	**42%**

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: The 2014 and 2018 risk vulnerability profiles suggest the DM to be in an improved risk position in 2018 compared to 2014. All aspects of the WSP process have improved, with higher risk vulnerability observed in terms of the management procedures (6) and the WSP review (7).

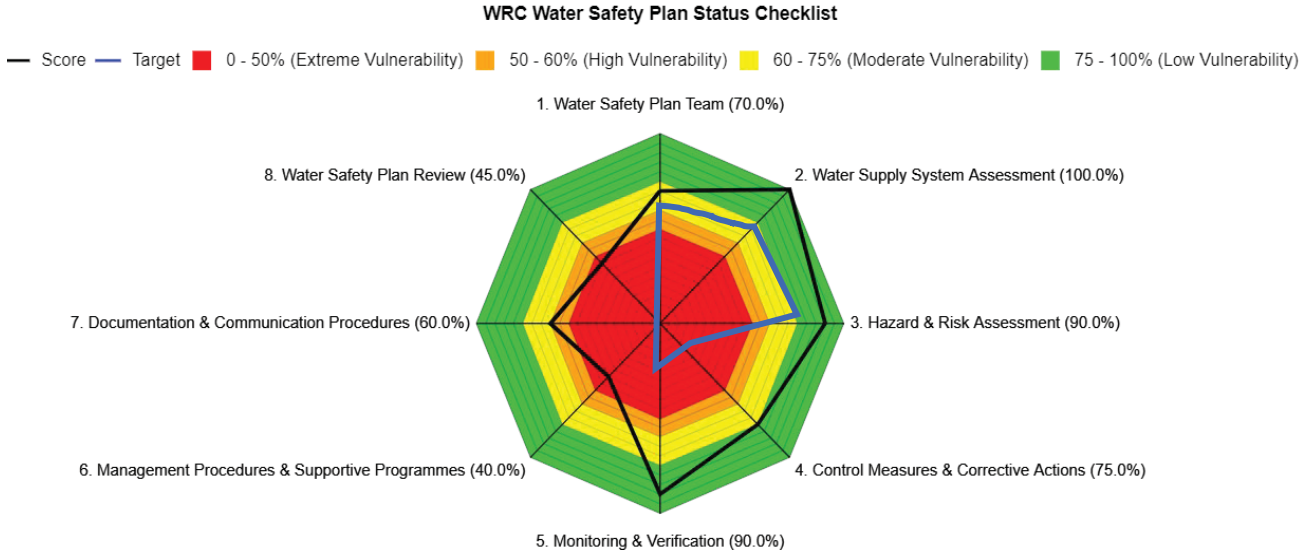


*Figure 5: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Zululand DM*

W_2RAP: The risk vulnerability assessment for the W_2RAP shows a similar profile for the 2014 and 2018 years. An improvement in noted for the system assessment (3). The highest risk in 2018 remains the identification of control measures (5), risk plan review (6) and record of completion (1).

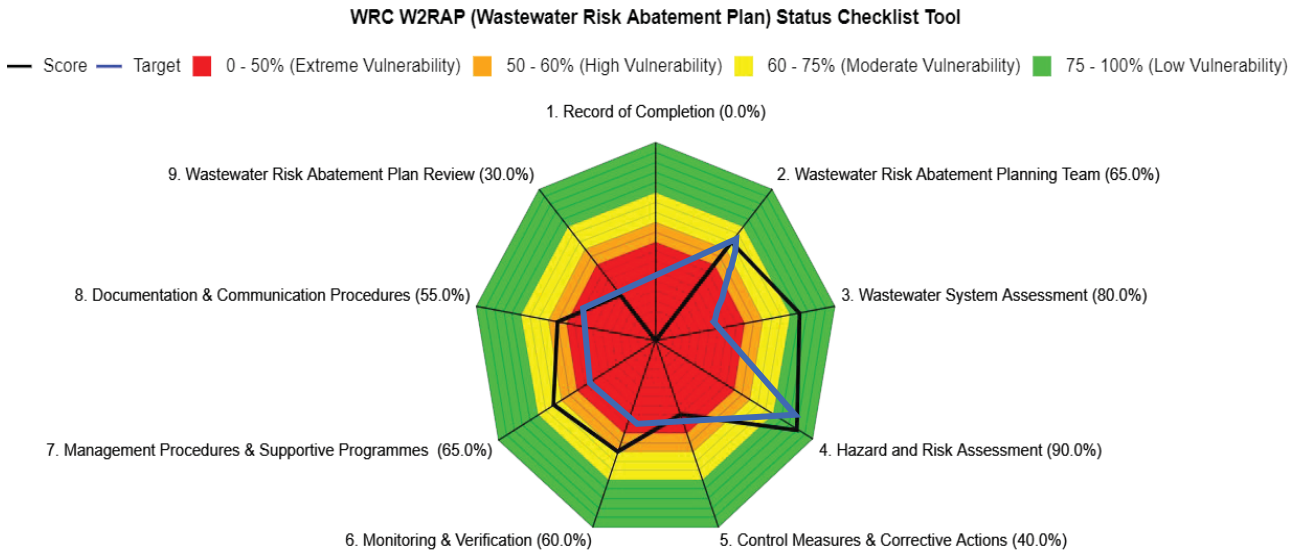


*Figure 6: Wastewater Risk Abatement Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Zululand DM*

DM's recommendations to improve on risk-based capacity building initiatives:

i. DWS to re-introduce the BD and GD audit programme to incentivise compliance, prioritise critical water services activities and drive risk management. This programme allowed the DM to identify risk, mobilise resources and implement risk mitigation;
ii. Sector partners to run education programs on the importance of saving water (e.g. communities still break water lines to form dams to water cattle);
iii. More programs which provide specialist support, e.g. conducting detailed Process Audits, network assessment and capacity;
iv. Financial practices in the water services sector, e.g. ring-fenced budgets, revenue collection to sustain service delivery;
v. Training to Councillors to have financial and risk focus;
vi. Refresher training on risk-based planning and implementation;
vii. DWS to resuscitate their mandate and programs as Regulator, to enforce compliance. Currently, there are no consequences in event of spillages, failures or non-compliance.

3.4 CASE STUDY 4: KZN – AMAJUBA DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for all 6 drinking water systems (undated) and W_2RAPs for all 4 wastewater systems (dated 2014). The DM indicated that they needed risk-based support on both aspects, specifically pertaining to risk management and implementation of risk plans. Support was provided under Project TT 693 in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Workshop on the processes involved in risk management;
- ✓ WSP developed for Durnacol.

2018 status of WSP and W_2RAP

No WSP and W_2RAP updates were done after close-out of pilot project TT 693. Risk matrixes were initially updated with the intention to review these annually, but this practice was not retained. The risk matrix documents used to serve before the Management Committee (Manco) for their notice. The Risk Action Plan that was developed during the WRC support project was not actively used to drive implementation, however, effort was made to mitigate some of the highest risks.

Risk-based planning and mitigation involved the technical staff only, with no involvement by political principles or other departments. A session took place with the Internal Auditor which involved discussion around risk. A session with the MMC took place with regard to broader water services aspects, but not within the context of the WSP or W_2RAP.

Strengths

- A coherent and enthusiastic technical team on the ground with an appetite to learn and implement risk-based measures;
- Increased awareness by the Internal Auditors;
- Good understanding of elevated and high risks that need to be addressed, and how the weight of risks inform priorities;
- BDIP and GDIPs was developed, which is regarded as a smaller version of the bigger Action Plan;
- Specific Champions are present who drive risk management on ground level and who has social capacity to communicate technical priorities to management and influence approval of plans.

Challenges in rolling out risk-based plans

- Do not have a long term Action Plan;
- Need assistance to improve the BDIP and GDIPs to a more workable and practical plan;
- Zero- to limited implementation of risk-based priorities takes place;
- Lack of information and detail on WWTW and WTP process units;
- Revenue collection is not sufficient to fund the implementation of Action Plans;
- Limited involvement by senior management;
- No networking or peer-to-peer interaction at conferences or workshops at medium technical management or Process Control level;
- Uncertain on how to monitor and track risk movement (from inherent/baseline risk to residual risk);
- Reliance on DWS for training and capacity development in risk management.

Reflection on WRC capacity development project

The team responded positively to the support project of 2015 and highlighted the following impressions:

- The DM was previously dependent on external consultants to assist with risk assessment and draft of a WSP and W_2RAP. After the support, the DM technical team is in a position to conduct risk assessments and reviews internally;
- A clear understanding of the processes and requirements of risk management;

- The plant inspection and risk assessment was valuable as it combined the theory and practice of risk management at a plant.

Results of the risk-impact analysis framework

Table 7: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for Amajuba DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	58.2% (Fare)	NI	70%* (Fare)	↑	*Improvement in all 6 BD criteria.*
	2	Green Drop score	60.4% (Fare)	NI	49%* (Very poor)	↓	*Digress in O&M, and asset management*
Risk Management	3	BD WSP score	24% (Critical)	NI	80%* (Good)	↑	-
	4	GD W_2RAP score	53% (Fare)	NI	50%* (Fare)	↓	-
	5	BDRR score	61% (med risk)	NI	NI	~	-
	6	GD CRR score	70% (high risk)	NI	49% (low risk)	↑	-
	7	WSP overall vulnerability	NI	NI	Highly vulnerable	↓	*See spider below*
	8	W_2RAP overall vulnerability	Highly vulnerable	NI	Highly vulnerable	~	*See spider below*
	9	# of disciplines involved in risk planning	Technical	Technical, Management	Technical	~	*Technical team drives process*
Skills and capacity	10	Understanding of WSP risk process	Poor	Good	Partial to Good	↓	*See Knowledge Survey results – 6 questionnaires*
	11	Understanding of W_2RAP risk process	Poor	Good	Mostly Partial	↓	*See Knowledge Survey results – 6 questionnaires*
	12	BD Technical Skills score	6%	NI	92%	↑	*R.2834 registration process successful*
	13	GD Technical Skills score	48%	NI	75%	↑	*R.2834 registration process successful*
	14	Submission of SDP to LGSETA	No	NI	Yes	↑	*NQF2-4 in 2015, NQF3 in 2018*
	15	Internal capacity – # of events on risk-based training	None	1 (WRC)	0	↓	*No events since WRC TT 693*
	16	WRC tools used	Yes	Yes	Yes	~	*Enthusiastic*
	17	Reliance on PSP to do risk planning	Yes	No	No	↑	*Can do in-house, but need expertise on Process Units*
Infrastructure management	18	Increase in OPEX	Baseline	Reduced 2% p/a	Reduced 2% p/a	↓	*10% of budget to water services, reduced by 2% p/a*
	19	Increase in CAPEX	Baseline	NI	NI	~	-
Business continuity and sustainability	20	Implementation of risk-based plans	Partial	Partial	Partial	~	*Main constraint = funding*
	21	Signed WSP and W_2RAP	No	No	No	~	*Council and Manco not signing off*
	22	Plant-based IMP	No	No	Yes	↑	*Unsigned*
	23	Integration into broader risk-based plans	No	NI	Yes	↑	*Uptake in safety plans, inform asset management and O&M manuals*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	3/10 improved	~	*Improvement = low turnover in staff, sludge management, water quality irregularities impact on BDS/GDS*

** Indicative Score based on a generic plant assessment, without verification of evidence*

Improvement	↑	**9**	**38%**
Digress	↓	**7**	**29%**
Unchanged	~	**8**	**33%**

The collective result of the Risk Indicators shows a ***neutral to positive trend***, with 38% of the indicators improving over the period 2014 to 2018, whereas 33% remain unchanged and 27% of the indicators digressed.

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: No WSP risk analysis was completed or WSP in place to conduct risk vulnerability assessments. In 2014, the WSP risks were evenly spread in the moderate risk space for most aspects related to risk planning, with the exception of risk plan review (8).

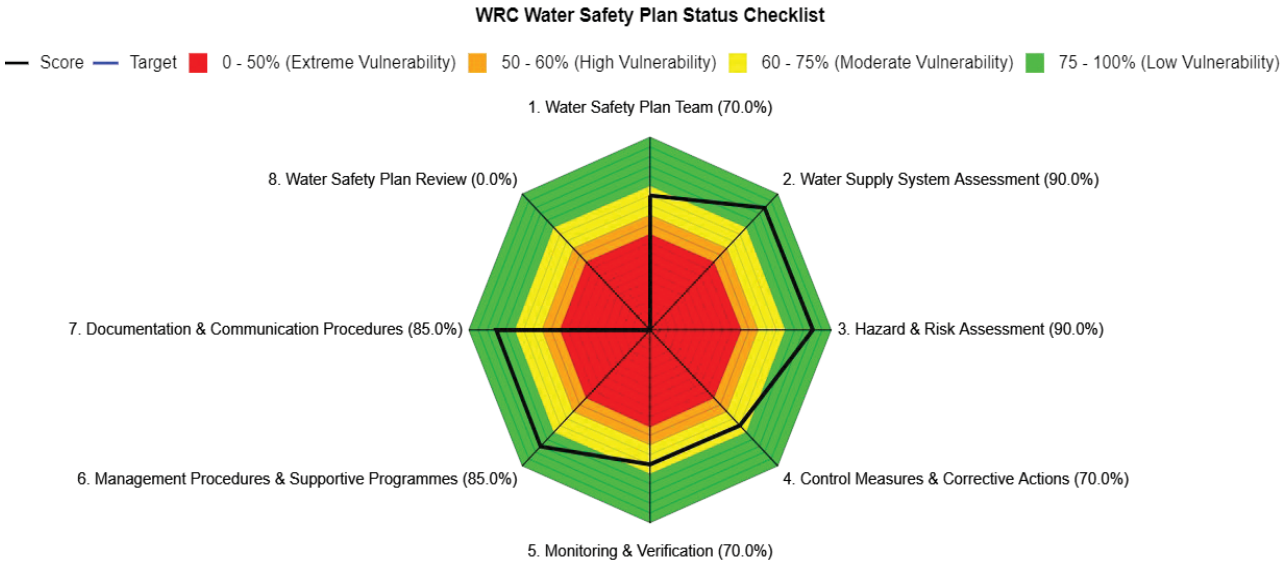


*Figure 7: Water Safety Plan Comparative Vulnerability Assessment for **2018 (black)** for Amajuba DM – no Water Safety Plan was available in 2014*

W_2RAP: The risk vulnerability assessment for the W_2RAP indicates that the DM was most vulnerable in the aspects dealing with implementation and record of completion of the plans in 2014. The 2018 self-assessment indicates that the more vulnerable areas are still in implementation in terms of the monitoring of control measures (6), frequent review of the risk plans (9) and record of completion (sign off by management) (1). Overall, the DM's risk vulnerability has improved slightly from 2014 to 2018.

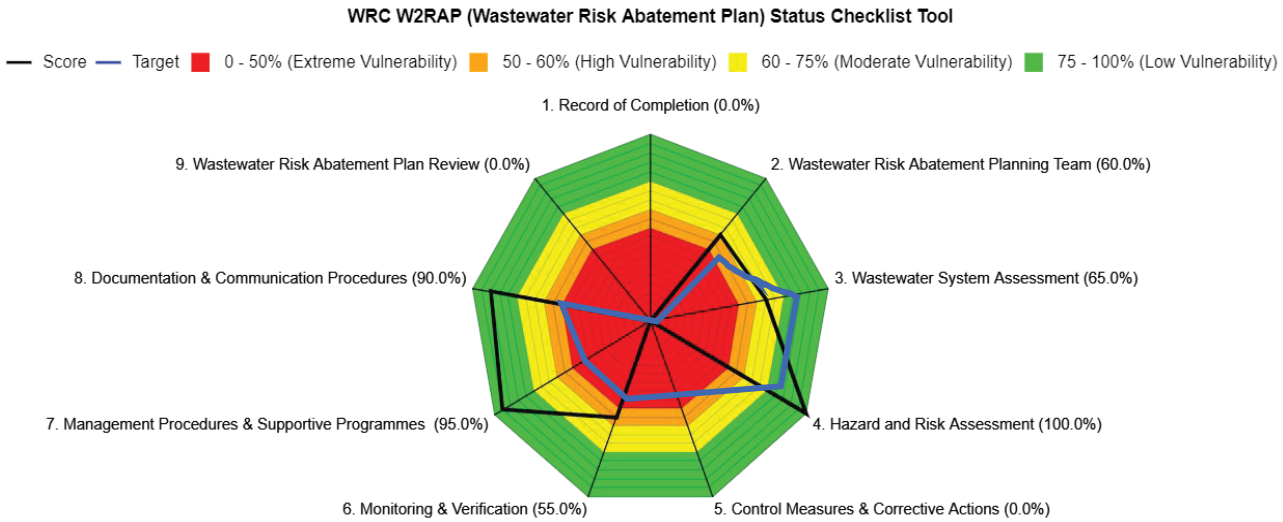


*Figure 8: Wastewater Risk Abatement Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Amajuba DM*

DM's recommendations to improve on risk-based capacity building initiatives:

i. DWS to reinstate the BD and GD programme, as it ensured impetus on risk management and provided good information on water services systems and performance;
ii. WRC and its partners to provide practical support in terms of operation of treatment works;
iii. External experts to conduct random checks to observe and report progress on the implementation of WSP and W_2RAPs;
iv. Technicians to be exposed to No Drop Certification, as this is a factor that impact negatively on Blue Drop scoring;
v. The DM knows the gaps, but does not have funding to address the mitigation measures. A support programme to identify funding sources and make submissions to fund risk implementation will be a meaningful enabler;
vi. Awareness campaigns every three years to re-instil the importance of risk management in municipalities.

3.5 CASE STUDY 5: KZN UTHUKELA DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for all 13 drinking water systems (2011) and W_2RAPs for all 9 wastewater systems (2013). A consulting firm assisted to prepare the plans. The DM indicated that they needed support on their WSPs specifically, as they were content with the status of the W_2RAPs. Support was provided under Project TT 693 in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Workshop on the processes involved in risk management;
- ✓ Development of 2 WSPs for Ekuvukeni and Winterton, respectively.

2018 status of WSP and W_2RAP

The DM confirmed that updated WSP and W_2RAPs were developed by different PSPs in 2015/16. The plans are unsigned and the completion record remains a challenge. No annual reviews takes place.

The Blue/Green Drop regulatory programme by DWS was a key driver to risk management and has left a gap in independent performance management, which has not been replaced with another system to date. During the period when the Drop programme was still active, the DM's BD/GD Task team met every 2nd week to discuss compliance against a risk perspective. This team has dissolved in the meantime. The recently appointed General Manager (GM) is putting effort to revive this team and reintroduce the practice. The GM succeeded to get the BD/GD principles adopted as WSA function and best management practice, whereby BDIP and GDIPs have been developed against the BD/GD KPIs with responding actions, comments and progress reporting. Council adopted this Performance Plan in 2017. Middle managers signed a SLA which stipulates the requirement to submit BD/GD progress report to Manco / Portfolio Committee on a quarterly basis. These are living documents and carry several benefits to the DM: 1) high state of readiness to respond to future BD/GD calls for audits by DWS; 2) implementation of a measurable system that reflect the key aspects of a compliant and performing treatment and collection system; 3) a living system that unites the staff members and focus them towards a common goal.

The municipal risk team consists of technical members only, with involvement by senior management and the risk officer. Deliberations are ongoing regarding the role of the DM as WSA and Umgeni Water as WSP. Cooperation between the two organisations is evident, with both being aligned to the BD/GD and risk-based principles and objectives. The role of the Umgeni PMU and Operations Manager is acknowledged in particular by the DM team. IMP development is on hold until the WSA/WSP arrangement is concluded. The role of the MMC in risk management is not yet concluded, but need to be resolved as part of the risk registry in future.

Risk management is practiced on organisation level, with each Department formulating its own risk register. The Risk Officer then consolidate the risks into an organisation risk plan, on a quarterly basis. An organisation risk assessment is done annually by the Risk Officer.

Strengths

- A multi-disciplinary, enthusiastic and dedicated technical team with strong Champions in the positions of acting WSA Manager and Scientific Services;
- An involved GM who succeed to motivate and create an enabling environment – quoted "…he sticks to priorities and performance measurement, often ask 'why'";
- A monitoring system which unites and focus the team and provides a basis for regular reporting;
- Site assessment and monitoring regimes in line with the BD and GD Site Inspection formats;
- Active involvement by municipal Risk Officer.

Challenges in rolling out risk-based plans

- Implementation of the maintenance aspects listed in the risk-based plans;
- Limited funding to implement priorities;
- Lack of BD and GD audits by DWS to measure and track progress from independent auditor.

Reflection on WRC capacity development project

The team reflected neutrally on the support project of 2015 and shared the following impressions:

- The WRC capacity building project was helpful to get a 1st order WSP in place and to serve as reference for future risk plan development;
- Due to a limited budget, only 2 WSPs could be developed – higher value could be derived via a full coverage of services with higher budget;
- The final WSPs were not received from the WRC project team. This could possibly have been due to outstanding information not allowing a final draft to be finalised.

Results of the risk-impact analysis framework

Table 8: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for uThukela DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	34.5% (Very poor)	NI	61%* (Fare)	↑	*Best improvement in WSP & management. Attention need – WUE*
	2	Green Drop score	26.8% (Critical)	NI	40%* (Very poor)	↑	*Best improvement in W_2RAP criterion. Attention need – effluent quality & sludge management*
Risk Management	3	BD WSP score	9% (Critical)	NI	85%* (Good)	↑	-
	4	GD W_2RAP score	50% (Very poor)	NI	50%* (Fare)	~	-
	5	BDRR score	55% (med risk)	NI	NI	~	-
	6	GD CRR score	76% (high risk)	NI	74% (high risk)	~	-
	7	WSP overall vulnerability	Extremely vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	8	W_2RAP overall vulnerability	Highly vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	9	# of disciplines involved in risk planning	Technical	Technical	Technical, Risk, Financial, Lab, Management	↑	*Multi-disciplinary team, support from GM*
Skills and capacity	10	Understanding of WSP risk process	Partial	Good	Partial to Good	↓	*See Knowledge Survey results – 9 questionnaires*
	11	Understanding of W_2RAP risk process	Partial	Good	Partial to Good	↓	*See Knowledge Survey results – 9 questionnaires*
	12	BD Technical Skills score	3%	NI	50%	↑	*R.2834 registration progress*
	13	GD Technical Skills score	24%	NI	58%	↑	*R.2834 registration required*
	14	Submission of SDP to LGSETA	No	Yes	Yes	↑	*SDP in place since 2015*
	15	Internal capacity – # of events on risk-based training	NI	1 (WRC)	Yes	~	*Including IRIS training to Councillors in isiZulu*
	16	WRC tools used	Yes	Yes	Yes	~	*Familiar with various WRC tools and requested more info*
	17	Reliance on PSP to do risk planning	Yes	Yes	Yes	~	*2015/16 updates by PSP, possibly use Umgeni in future as WSP*

Infrastructure management	18	Increase in OPEX	Baseline	Increase	Increase	↑	*6% increase per year*
	19	Increase in CAPEX	Baseline	NI	NI	~	
Business continuity and sustainability	20	Implementation of risk-based plans	NI	NI	Partial	↑	*Budget limitations, re-institutionalise BD/GD and risk management*
	21	Signed WSP and W_2RAP	No	No	No	~	*Submitted for approval, no feedback to date*
	22	Plant-based IMP	NI	NI	No	~	*Await WSA/WSP to conclude arrangement*
	23	Integration into broader risk-based plans	Partial	Partial	Yes	↑	*Inform performance SLA with staff, DM risk plan, WSDP -> IDP*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	5/10 improved	↑	*Improvement = staff retention, water quality info, GDS/BDS, sludge and energy management*

** Indicative Score based on a generic plant assessment, without verification of evidence*

The result of the collective Risk Indicators shows a ***positive trend***, with 54% of the indicators improving, 38% remain unchanged and 8% digressing over the period 2014 to 2018.

Improvement	↑	**13**	**54%**
Digress	↓	**2**	**8%**
Unchanged	~	**9**	**38%**

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: The 2014 and 2018 risk vulnerability profiles differ vastly, with lesser vulnerability in 2018. The 2014 profile shows lesser vulnerability for the risk assessment phases (2,3) with higher vulnerability for setting controls, implementation and reviewing (4-8). The 2018 profile show higher risk resilience with a balanced profile for all elements, with the exception of risk review (8) and completion records (1).

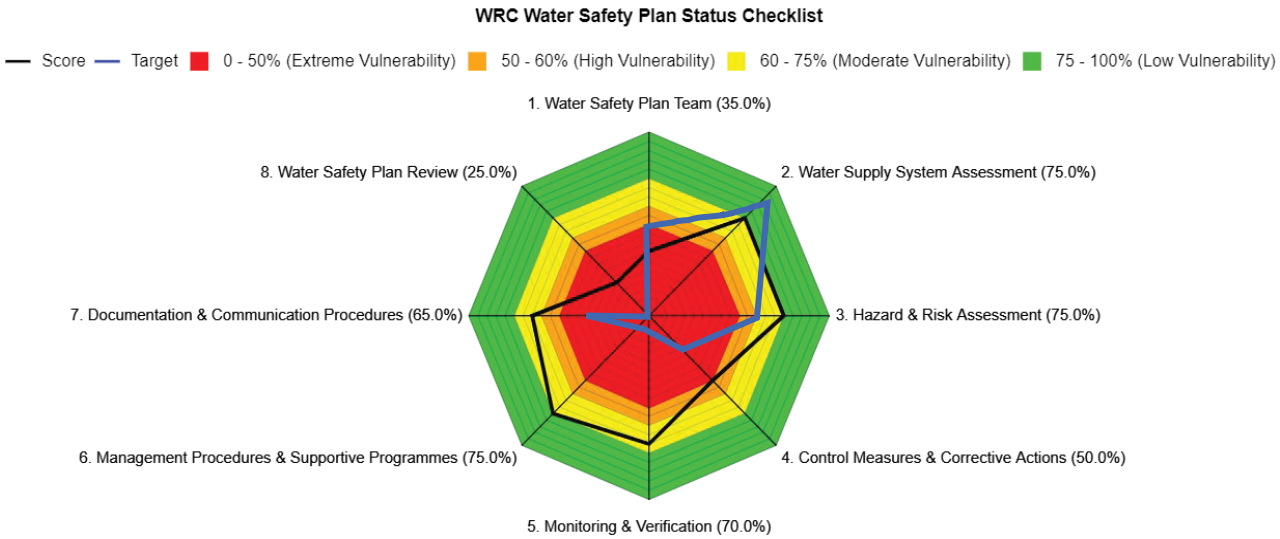


*Figure 9: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Uthukela DM*

W_2RAP: Similar to the WSP, the risk vulnerability assessment for the W_2RAP in 2014 shows lesser vulnerability for the risk assessment phases (2,3,4) with higher vulnerability for the monitoring and control elements (6-9). The 2018 profile show higher risk resilience with a balanced profile for all elements, with the exception of risk review (8) and completion of records (1).

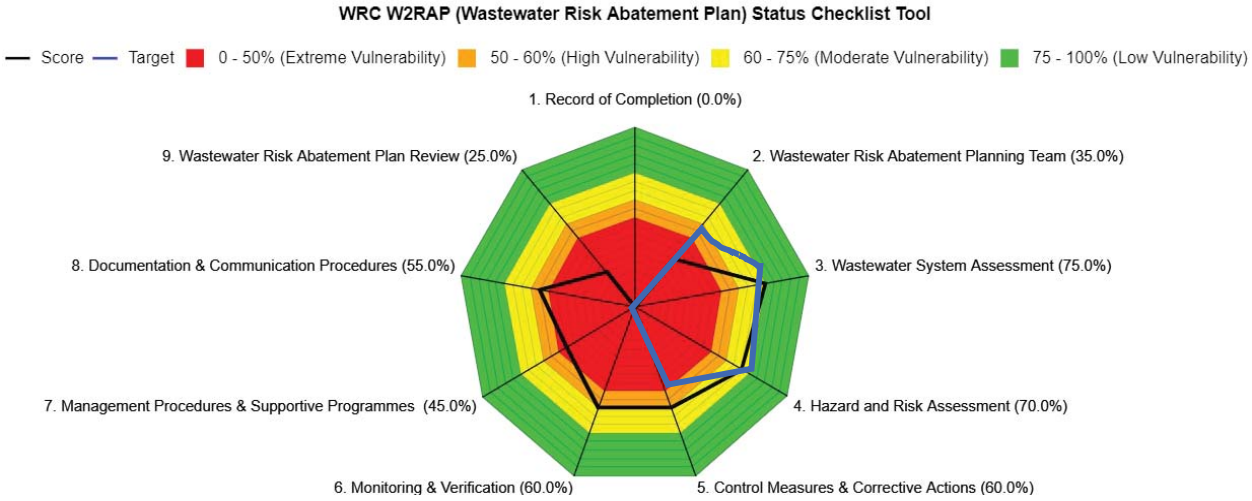


*Figure 10: Wastewater Risk Abatement Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Uthukela DM*

DM's recommendations to improve on risk-based capacity building initiatives:

i. DWS to revive the Blue/Green Drop audits and reporting, aided by the constructive and expert guidance of the Lead Inspectors;
ii. Assistance is needed to implement Good Laboratory Practices and improvement of quality assurance;
iii. IRIS training by DWS is needed to stay current on the regulatory reporting requirements;
iv. Training needed on conducting plant assessment with the aim of optimisation;
v. Knowledge transfer in sludge management;
vi. Knowledge transfer in conducting energy audits and management;
vii. Increase training events on risk and water services to Councillors (preferable in the home language) – involve SALGA and COGTA;
viii. Refresher courses on WSP and W_2RAPs – target existing and new staff members who are new to the principles of risk management.

3.6 CASE STUDY 6: KZN HARRY GWALA DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for 12 out of 13 drinking water systems (2013) and W_2RAPs for all 9 wastewater systems (2013). The development was done by Umgeni Water in support of Harry Gwala DM. The DM indicated that they needed support on both WSP and W_2RAPs, specifically pertaining to review of the 2013 documents, updated Improvement/Action Plan, and tracking of implementation progress. Support was provided under Project TT 693 in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Workshop on the processes involved in risk management;
- ✓ (No WSP or W_2RAPs were developed).

2018 status of WSP and W_2RAP

The 2013 WSPs and W_2RAPs were reviewed internally in 2016 by a team consisting of members of the Water Services, Infrastructure and Risk Management Unit. The team experienced challenges in using the WRC Guidelines and did not have the WRC excel tool or other formats for risk assessment. The previous Champion left without hand-over of the documents or transfer of knowledge.

Risk management is driven by a technical team comprising of water quality, process control and regulation staff. The Municipal Manager is supportive of the staff. The Councillors are not involved in risk identification or risk-based processes. However, all policies and strategies pertaining to risk management have been approved by Council. The WSPs and W_2RAPs have been submitted to the Portfolio Committee for approved, followed by EXCO, then to Council for adoption and approval. No funding is available to implement the risk mitigation measures. The Risk Management Unit is responsible for oversight of risk planning and implementation.

The WSDP has been reviewed with the assistance of DWS, COGTA and DBSA. A strong reliance on consultants is evident, which include the development of Process Audits, review of the WSDP, asset management, etc. The DWS previously provided much needed support and knowledge sharing, but the Department no longer has the capacity to continue this work. One DWS scientist is specifically mentioned for his motivation and regulatory overview in the past, with appreciation of this scientific knowledge and hands-on approach.

Strengths

- Support by the Municipal Manager is evident – quote "*caring, understand, prioritise, high importance to water services*';
- Supportive and hands-on Mayor, who pays personal visits to the treatment plants and prioritise water issues;
- Willingness by the Mayor and politicians to participate and avail a portal to communicate;
- Champions are available in middle management to drive risk management of water services;
- Technical team is described to have strong work ethics and are compliance and performance driven;
- Various consultants are appointed to proceed with specific projects, including the development of Process Audits;
- Good relationship with business and agricultural sector;
- DWS involvement serves to motivate team;
- Technical team eager to learn, as was evident by the request for additional information during the 2018 interview.

Challenges in rolling out risk-based plans

- Dependence on grants render the organisation to be financially unsustainable;
- The DM is currently under 'business rescue', with the Province assisting the DM with their financial situation;
- No budget to implement WSPs and W_2RAPs – these are therefore not living plans;
- An Acting Head of Department who has a high work load with limited capacity to be involved in aspects such as WSP and W_2RAP;
- Continuous shift in priorities, due to the challenges faced – reactive governance is not ideal;
- No hand-over of risk-based work from the previous Champion, including the capacity building work during the WRC TT 693 project;
- The 'silo effect" impacts negatively on risk management and sharing of knowledge. In particular, the Finance Department receive requests for job orders, but do not have an understanding of the implications of delayed processing of orders, lacking a sense of urgency;
- The Directorate Research Planning and Design is responsible for risk management. Meetings are held infrequently, and does not include a specific Agenda item for WSP and W_2RAP;
- Skills Development Plans are drafted, but do not translate to any training or specific output.

Reflection on WRC capacity development project

The team could not respond to the WRC support project of 2015 as the Champion left and no hand-over of documents and knowledge took place.

Results of the risk-impact analysis framework

Table 9: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for Harry Gwala DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	62.97% (Fare)	NI	59%* (Fare)	↓	*Lowest score for WUE and water quality compliance. High WSP score*
	2	Green Drop score	67.1% (Fare)	NI	44%* (Very poor)	↓	*Improve in O&M, technical skills, and effluent compliance*
Risk Management	3	BD WSP score	20% (Critical)	NI	80%* (Good)	↑	-
	4	GD W_2RAP score	75% (Fare)	NI	63%* (Fare)	↓	-
	5	BDRR score	48% (low risk)	NI	NI	~	-
	6	GD CRR score	55% (med risk)	NI	60% (med risk)	↓	-
	7	WSP overall vulnerability	Extreme vulnerable	NI	Low vulnerable	↑	*See spider below*
	8	W_2RAP overall vulnerability	Extreme vulnerable	NI	Moderate vulnerable	↑	*See spider below*
	9	# of disciplines involved in risk planning	Technical	Technical	Technical	~	*Technical team drives process with support by management*

Skills and capacity	10	Understanding of WSP risk process	Partial	Good	Good	↑	*See Knowledge Survey results – 3 questionnaires*
	11	Understanding of W_2RAP risk process	Partial	Good	Good	↑	*See Knowledge Survey results – 3 questionnaires*
	12	BD Technical Skills score	5%	NI	50%	↑	*R.2834 registration offers improvement opportunity – new IRIS*
	13	GD Technical Skills score	62%	NI	50%	↓	*R.2834 registration offers improvement opportunity – new IRIS*
	14	Submission of SDP to LGSETA	Yes	NI	Yes	~	*SDP drafted, but no output, no training. Limited NQF2-3 training of PCs.*
	15	Internal capacity – # of events on risk-based training	NI	1 (WRC)	0	↓	*No risk training events since WRC TT 693. DWS & COGTA training = water loss + water balances*
	16	WRC tools used	No	NI	No	~	*Champion left without hand-over, difficulty to use WRC tools without training*
	17	Reliance on PSP to do risk planning	Yes	Yes	Yes	~	*Reliance on Umgeni Water and PSPs for specialist support*
Infrastructure management	18	Increase in OPEX	Baseline	NI	NI	~	*Financial information with Finance*
	19	Increase in CAPEX	Baseline	NI	NI	~	*Financial information with Finance*
Business continuity and sustainability	20	Implementation of risk-based plans	Partial	Partial	No	↓	*No budget to implement*
	21	Signed WSP and W_2RAP	No	No	Yes	↑	*Council approved*
	22	Plant-based IMP	Yes	Yes	Yes	~	*Internal reviewed, outdated – 2013, unsigned*
	23	Integration into broader risk-based plans	No	NI	Partial	↑	*WSP/W_2RAP managed by Risk Management Unit. No specific mention of how the Risk Plans inform other plans*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	3/10 improved	~	*Improvement = MM involvement, GDS/BDS uploads, approval of WSP/W_2RAPs.*

** Indicative Score based on a generic plant assessment, without verification of evidence*

The collective result of the Risk Indicators shows a ***predominantly neutral to slightly positive trend***, with 33% of the indicators improving, 29% digressing and 38% remains unchanged over the period 2014 to 2018.

Improvement	↑	**8**	**33%**
Digress	↓	**7**	**29%**
Unchanged	~	**9**	**38%**

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: The 2014 and 2018 risk vulnerability profiles are vastly different, suggesting an interesting movement in activities and understanding of the process. The 2014 profile shows extreme vulnerability with the exception of system and risk assessment (2,3) and control measure (4). In the contrary, the 2018 profile shows a low vulnerability with a balanced spread over the lower vulnerable risk areas for all 8 areas.

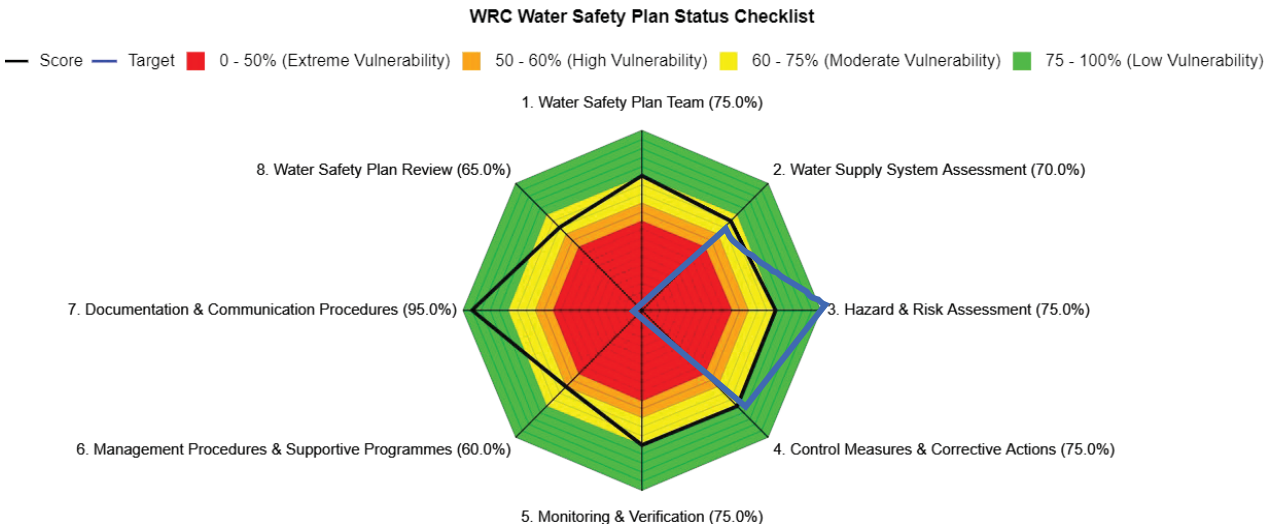


*Figure 11: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Harry Gwala DM*

W_2RAP: The risk vulnerability assessment for the W_2RAP in 2014 and 2018 indicates vastly different profiles. The 2014 profile showed extreme vulnerability in all areas except risk assessment and control measures (4,5). The 2018 profile suggest lower vulnerability to risk, with the exception of the review and completion process (9,1).

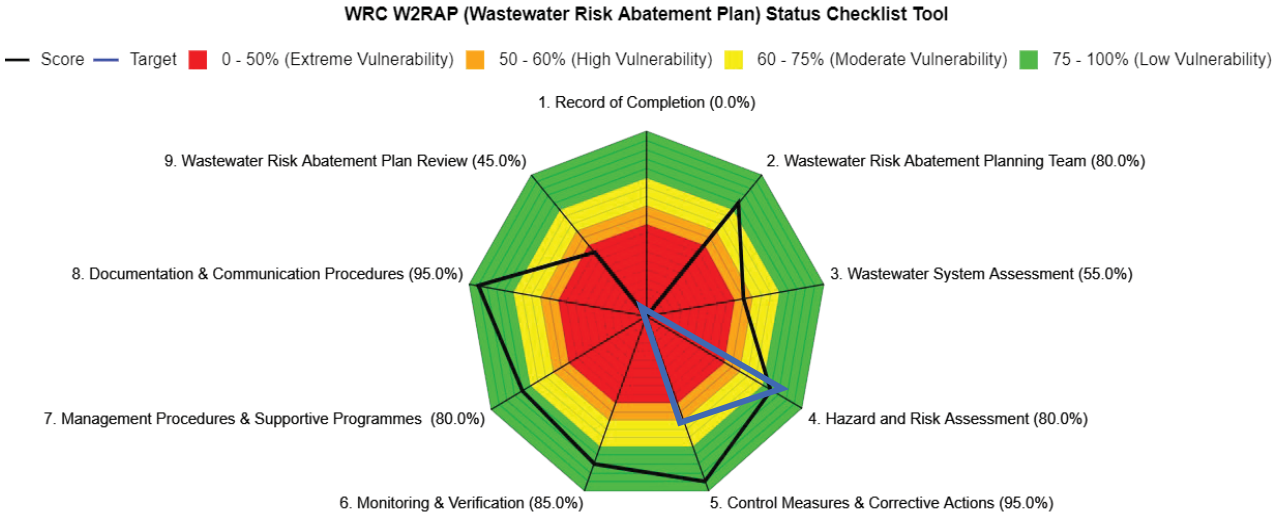


*Figure 12: Wastewater Risk Abatement Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Harry Gwala DM*

For both WSP and W_2RAP, the DM's self-assessment of vulnerability in lower areas for implementation of risk measures contradicts to some extend the results of the interviews which indicated that no risk mitigation is being implemented.

DM's recommendations to improve on risk-based capacity building initiatives:

i. DWS to re-introduce the BD and GD audit programme, as this programme provided a measure of compliance and performance, and which areas to improve. This programme previously assisted to mobilise and motivate for resources within the DM;
ii. WRC to release tools and documents with sufficient support to also do training on these materials. The DM suggests that a municipal champion be identified for each DM who attend WRC training sessions, whereby WRC cover the disbursement costs, and the Champion is responsible to train and share new knowledge upon return to the DM team;
iii. Reintroduce capacity building projects on risk management – considering that different levels of training: 1) junior managers / process controllers; 2) senior management; 3) Councillors;
iv. Expert assistance is needed to draft Terms of Reference to tender for service provides for specialist work.

3.7 CASE STUDY 7: KZN UMZINYATHI DM

Risk-based support provided

At commence of the capacity development project in 2015, the DM had WSPs for all 12 drinking water systems (no date) and W_2RAPs for 4 out of the 8 wastewater systems (dated 2014). The W_2RAP consisted of one document, with sections that represent the different systems. The WSPs had limited information on drinking water unit processes. The DM indicated that they needed risk-based support on both plans, in particular in the identification of control measures, development of management procedures and tracking of implementation. Support was provided under Project TT 693 in terms of:

- ✓ Development of Risk Action Plans;
- ✓ Workshop on the processes involved in risk management;
- ✓ (No WSP or W_2RAPs were developed).

2018 status of WSP and W_2RAP

No WSP and W_2RAP updates were done after close-out of pilot project TT 693 and the 2014 versions are no longer in use. The Risk Action Plan was not actively used to direct implementation. No risk management is currently taking place. The WSA Manager previously championed water services risk management. However, since his suspension, no further initiatives have taken place. The Senior Manager who is currently acting in the position for last 6 months, focusses mostly on the basic aspects of 'water in the tap'.

Prior to 2014, Council would request the status of the Blue/Green Drops and detailed results. This practice has not been retained since the stagnation of the Drop regulation by DWS. The Risk Plan Officer is responsible for risk management on organisational level, but this practice does not involve the water services staff directly. The WSDP is outdated (2013) and is therefore not informed by- nor contributing to risk management.

Risk-based planning and mitigation involves the technical personnel only, with no involvement by senior management or other departments. Since 2014, no Councillor or oversight of the water services portfolio was in place. Deliberations is ongoing regarding the WSA and WSP functions and how this reporting structure should function. One option under consideration is that the WSA moves reports to the office of the MM in a monitoring role.

Strengths

- Increase in Capex and Opex, with good understanding by the CFO of the challenges involved in aging infrastructure;
- Availability of consultants to support critical functions (also listed as a 'challenge', depending on the value add and quality of work completed by the consultant).

Challenges in rolling out risk-based plans

- Limited budget to implement water services priorities;
- Constraints to streamline processes and staff since takeover of water services from uThukela in 2013;
- Senior position filled, but junior positions have many vacancies;
- Aging infrastructure will have a significant impact on the future Blue/Green Drop scores;
- No continuity since the WRC support project, Action Plans are not implemented;
- Inferior standard of work or limited valued add of work conducted by some consultants.

Reflection on WRC capacity development project

The team was not closely involved in the WRC capacity building project and could not reflect on this project.

Results of the risk-impact analysis framework

Table 10: Comparative analysis of key indicators: 2014 vs 2016 vs 2018 for uMzinyahti DM

Focus Area	#	Indicator	2014	2016	2018	Trend	Comment
			Baseline	*After support project*	*Risk impact review*		
Water Services Performance	1	Blue Drop score	78.0% (Fare)	NI	53%* (Fare)	↓	*Lowest scores in WSP and WUE*
	2	Green Drop score	61.5% (Fare)	NI	38%* (Very poor)	↓	*Lowest scores in W_2RAP and sludge management*
Risk Management	3	BD WSP score	28% (Critical)	NI	30%* (Critical)	~	-
	4	GD W_2RAP score	31% (Critical)	NI	25%* (Critical)	↓	-
	5	BDRR score	53% (med risk)	NI	NI	~	-
	6	GD CRR score	69% (med risk)	NI	NI	~	*DWS PAT incomplete*
	7	WSP overall vulnerability	Extremely vulnerable	NI	Extremely vulnerable	~	*See spider below*
	8	W_2RAP overall vulnerability	Extremely vulnerable	NI	Extremely vulnerable	~	*See spider below*
	9	# of disciplines involved in risk planning	Technical	Technical	None to limited (technical)	↓	*No risk planning*
Skills and capacity	10	Understanding of WSP risk process	Poor	Good	Partial to None	↓	*See Knowledge Survey results – 2 questionnaires*
	11	Understanding of W_2RAP risk process	Poor	Good	Partial to None	↓	*See Knowledge Survey results – 2 questionnaires*
	12	BD Technical Skills score	5%	NI	50%	↓	*Level 2 on BDS*
	13	GD Technical Skills score	50%	NI	25%	↓	*Level 1-2 on GDS*
	14	Submission of SDP to LGSETA	No	NI	NI	↓	*NQF2-4 progressing slowly*
	15	Internal capacity – # of events on risk-based training	None	1 (WRC)	0	↓	*No events since WRC TT 693*
	16	WRC tools used	Yes	Yes	No	↓	*More pressing priorities*
	17	Reliance on PSP to do risk planning	Yes	No	Yes	↓	*Use PSP for GDS/IRIS data capture, business plants, Lab services, etc.*
Infrastructure management	18	Increase in OPEX	Baseline	Increased	Increased	↑	*CoGTA recognised underfunding of O&M, now 8% of budget*
	19	Increase in CAPEX	Baseline	Increased	Increased	↑	*Yr1-R30m, Yr2-R45m, Yr3-R145m*
Business continuity and sustainability	20	Implementation of risk-based plans	Partial	Partial	None	↓	*No risk management*
	21	Signed WSP and W_2RAP	No	No	No	~	*Risk management not a priority*
	22	Plant-based IMP	No	No	No	~	
	23	Integration into broader risk-based plans	No	NI	No	~	*Risk Management Officer not using risk plans*
	24	Addressing 10 key challenges of 2016	10 challenges	10 challenges	1/10 improved	~	*1 = retain staff*

** Indicative Score based on a generic plant assessment, without verification of evidence*

The collective result of the Risk Indicators shows a ***negative trend***, with 54% of the indicators digressing and 38% remain unchanged. Only 8% of the indicators showed an improvement, which relates to the increase in budgets for operational and capital works over a 3 year period.

Improvement	↑	**2**	**8%**
Digress	↓	**13**	**54%**
Unchanged	~	**9**	**38%**

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: The risk vulnerability assessment shows extreme vulnerability on all aspects except Risk Assessment (3), for 2014. Reassessment in 2018 indicate high to extreme vulnerability on all aspects expect Water Supply System Assessment (2). The overall profile improved marginally, but still remain overall in extreme vulnerability to risk.

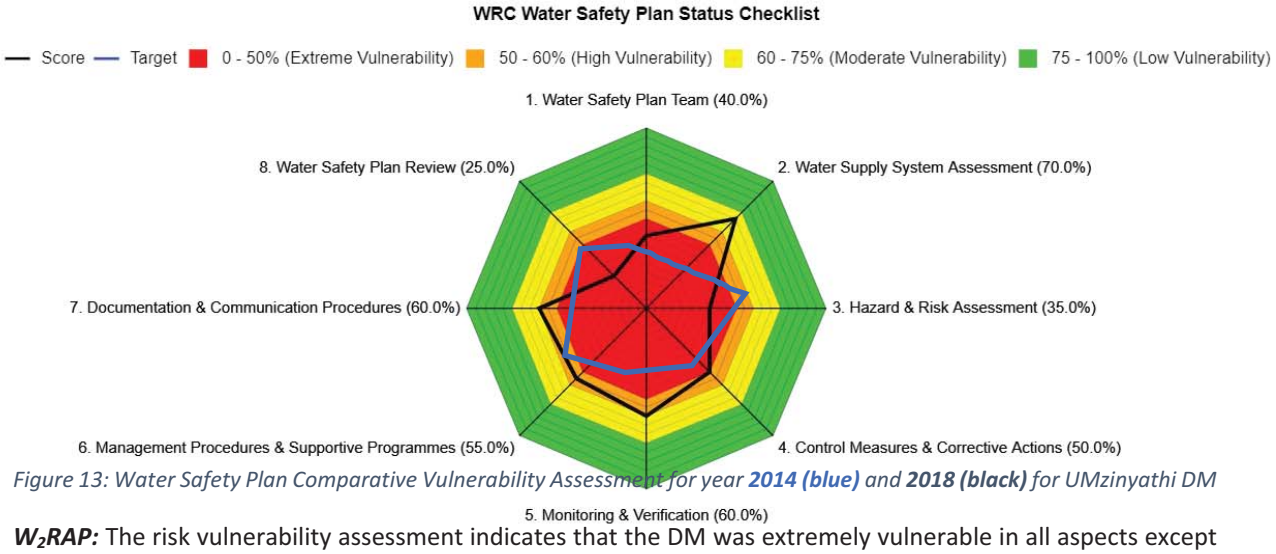


*Figure 13: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for UMzinyathi DM*

W$_2$RAP: The risk vulnerability assessment indicates that the DM was extremely vulnerable in all aspects except for System and Risk Assessments in 2014 and 2018. The most vulnerable areas are the implementation and completion elements (9,1).

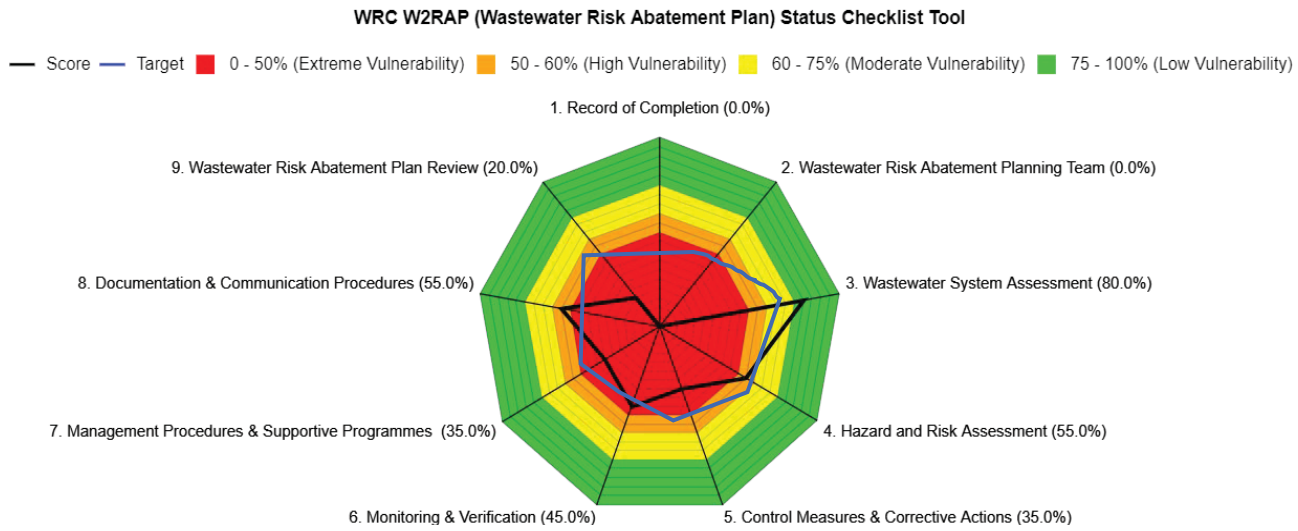


*Figure 14: W$_2$RAP Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Umzinyathi DM KZN*

DM's recommendations to improve on risk-based capacity building initiatives:

i. Professional support to assist with the development of Business Proposals to access funds to reinstate risk planning in the DM;
ii. Assistance to develop WSP and W_2RAPs;
iii. Training on risk management and how to use risk matrixes to improve performance;
iv. Use of risk-based plans to mobilise resources.

3.8 CASE STUDY 8: EC AMATHOLE DM

Selection of Amathole DM

Amathole DM has not been part of the WRC capacity building pilot project in 2015/16, and therefore, served as '*reference municipality*' in this study. Amathole DM was selected as reference DM for the following reasons:

- The DM indicated that no support was needed from the WRC TT 693 support team, as the management team were content with their capacity to execute risk management, to track and sustain progress and to maintain high quality Water Safety Plans and W_2RAPs;
- A Blue Drop score of 80.4% and low risk BDRR score of 40% in 2014;
- A Green Drop score of 60.4% with moderate risk CRR score of 55% in 2014;
- A WSP and W_2RAP score of 29% and 100%, respectively (2014);
- The DM was one of the 1st municipalities to combine a Risk Assessment with a Process Audit, which has since become best practice and an industry norm in South Africa.

The DM had high confidence in their team's capacity and capability to perform risk management due to:

- The initial use of specialist consultants to identify risks in the field and to develop risk plans, in accordance with Blue/Green Drop standards;
- The development of appropriate tools and formats for future use;
- Training of the ADM staff in setting up the DM team to undertake risk assessment in-house in future years.

The benefit of having a reference municipality is to increase the reliability of the results, through a comparison between the reference site which has been capacitated prior to the pilot study, and DMs who were under-capacitated and therefore, recipients of risk-based capacity building.

2018 status of ADM's risk management

The most recent WSPs are dated 2014/15 and W_2RAPs are dated 2015/16. The risk plans have been aligned to the business activities of the organisation, namely: 1) management, 2) O&M, 3) infrastructure, and 4) compliance. The DM also commenced with the monitoring of the implementation of risk mitigation at 3 levels of risks: 1) high, 2) medium, and 3) low.

Risk management have not progressed as planned, mostly as result of the difficulties experienced in sustaining the business, with limited/no operational income. Various government departments have been involved in a 'business rescue' process since 2017, coupled with the introduction of new management to

formalise a Turnaround Strategy for the DM. These developments has compromised further work in risk management and capacity development.

The team members of 2014 have been retained, which means a high level of knowledge and competence still resides with the ADM team. The IMPs were done in-house and is still being applied, although implementation is currently hampered by the current situation. Internal sessions are held to refresh and sustain capacity and new knowledge introduced as far as possible. Understandably, the team's morale has been affected by the uncertainty and instability that initiated business rescue in 2017.

Blue/Green Drop audits and reports have formerly been a key driver of the DM's prioritisation and focus, including risk management and capacity building. The absence of the BD/GD programme by DWS, water services performance and risk mitigation are not at the centre of the municipal business or information decisions at the present time, as the focus is primarily on business/financial resuscitation.

Progress since 2014

Despite the set-backs experienced, the ADM team has been able to engage in various initiatives related to risk-based planning:

- Sludge management was prioritised and activities such as the characterisation of sludge and beneficial use thereof were incorporated into the risk abatement plans;
- Plans for a laboratory has been developed, complete with feasibility studies and quality assurance aspects, but not implemented. This project was halted with the onset of the financial difficulties;
- The WSPs and W_2RAPs were successfully applied to motivate for funding, e.g. generators where energy provision proved a high risk, etc.;
- Energy has been identified as a risk to the DM's water business in terms of cost, reliability of supply and efficiency of use. The following mitigation measures were implemented:
    - Renewable energy – options were investigated in terms of the potential to generate energy and heat at the WWTW. The finding was that the plants were too small to justify a capital investment of this nature;
    - Energy Efficiency – energy supply points were audited to understand the cost, including boreholes, with consideration of different line fee charges and tariffs;
    - The number of WWTW and pumpstations are to be reduced by superseding stations in Butterworth (9 reduced to 7). This project is in progress. The 14 Fort Beaufort pumpstations could not feasibly be reduced, whilst the Alice station present a borderline case;
    - Hydro-electrical systems and solar options were investigated as source of energy to the plants; and
    - High pumping heads (300-400m) were identified as a risk and were found to be cost inefficient.
- Investigations into the centralisation of a number of treatment facilities commenced;
- Cost drivers such as the unit cost of treatment were calculated in detail (staff, chemical, electricity), whereby straight line costing showed a high risk scenario that need to be mitigated in future.

Emerging risks and challenges in implementation of risk-based planning

- Community expectations for water born sanitation and high level of water services were identified to hold a risk in terms of sustainable of supply;
- The management of pit latrine sludge;
- Implementation of rural yard sanitation in line with the policy approval;
- Difficulty to solicit an understanding with leadership to own and prioritise risk-based decision and integrate WSP and W_2RAP into higher organisation plans and resources;
- A number of partnerships was developed in response to business rescue, however, none of them took a risk-based approach;
- The personnel restructuring and movement of staff disrupted the focus on risk management and application of human capacity to retain momentum in the once highly regarded risk management practices of the DM;
- Risk practices continue on organisational level, but does not necessarily aid in the work in the field;
- Engineering and technical staff have not mastered the social skill of communicating engineering aspects to non-engineers, which hampers understanding and working towards common objectives;
- The 'silo effect' is not assisting the identification and implementation of solutions towards a common objective;
- 'System phobia' is a potential risk in the DM, whereby software is introduced with new projects or during capacity building projects, without a means to consolidate or apply the Information Technology (IT) meaningfully. As example, the WRC pilot project also intended to introduce new software and tools into a system which already suffered from IT fatigue.

Recommendations for improved risk-based planning at DM level

The DM team consisted of a valuable mix of high-end management and operational professionals, who recommended the following aspects towards conceptualisation of a national capacity building model:

- Internal auditors have a potentially valuable role to play in risk management and the capacity to execute risk mitigation. The ADM Internal Auditors became increasingly involved in water quality, procedures and safety planning, which facilitated an improved understanding of the water services portfolio and risks. Replication of a partnership whereby the technical and audit departments collaborate, may offer distinct advantages in future – especially if the BD/GD audit process remain stagnant;
- DWS to relaunch the Blue/Green Drop programme, and sustain this initiative for next 10 years +;
- DWS to consult with other sector departments to align their support initiatives to the BD/GD programme, whereby the BD/GD audit scores become a validation and measurable indicator of the success of services delivery and capacity in the municipalities;
- Promote and provide practical assistance to conduct self-assessments in municipalities, thereby internalisation the principles and best practice of the Blue/Green Drops;
- Documentation and sharing of experiences amongst municipalities through case studies;
- Support and capacity development initiatives should be ''packaged' according to the actual need by the municipality. Current support initiatives leans towards a model that pre-design and pre-determine a response to generic or perceived problems, without obtaining insight into the actual problems facing the municipalities;

- Any support or capacity building should be undertaken by experienced specialists to maximise benefit to the municipality and ensure high quality outputs;
- Ensure that Blue/Green Drop audits become part of the institutional audit process, as this will place water services at the centre of the organisation, i.e. a 'game changer';
- Develop a mechanism to measure the impact of capacity building that can be applied as a norm with all/any capacity development and support projects.

Risk vulnerability comparison: 2014 vs 2018

Water Safety Plan: The risk vulnerability assessment shows that the DM succeeded to mitigate most vulnerabilities in 2018, which provides for a balanced risk profile along moderate risk boundaries. In comparison to 2014, the profile digressed in most areas (2,3,6,7) and improved in other areas (8,1), which may be a reflection of the business difficulties experienced.

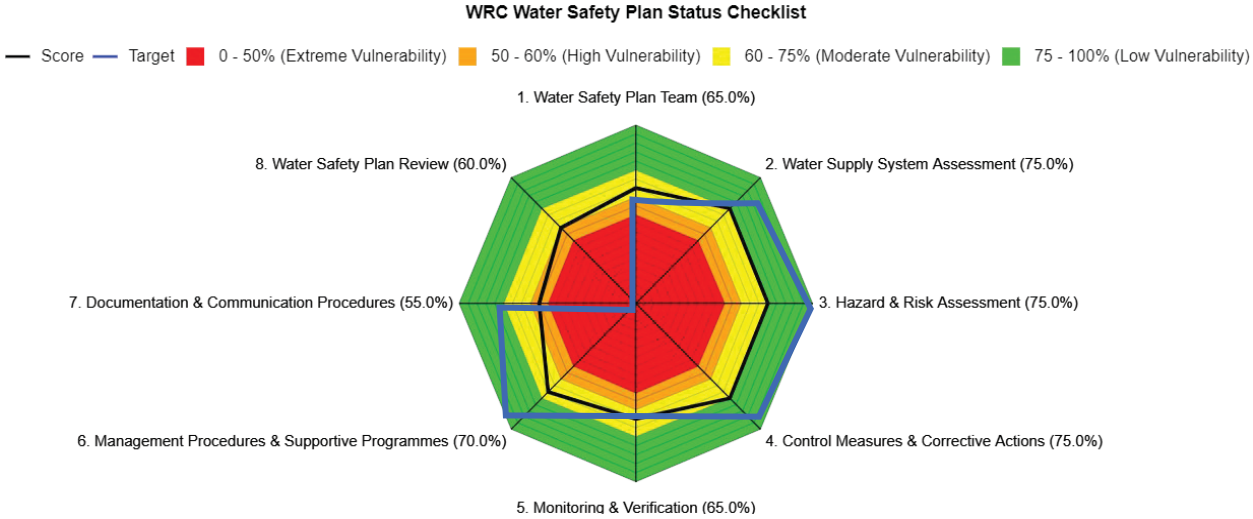


*Figure 15: Water Safety Plan Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Amathole DM*

W_2RAP: The risk vulnerability assessment for the W_2RAP follows the same trend as for the WSP, whereby the overall profile digressed from 2014 to 2018, noting that the review processes remain in extremely vulnerable space.

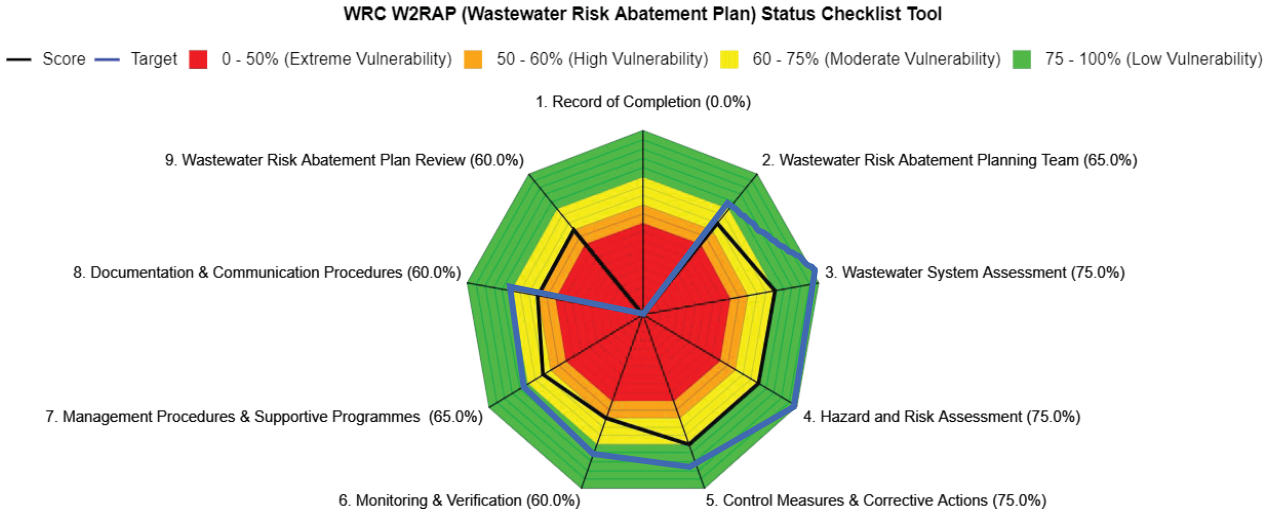


*Figure 16: Wastewater Risk Abatement Comparative Vulnerability Assessment for year **2014 (blue)** and **2018 (black)** for Amathole DM*

4. UPTAKE AND INTEGRATION OF RISK ON INSTITUTIONAL LEVEL

4.1 WATER SERVICES RISK LINKED TO OTHER RISK TYPES IN THE MUNICIPAL ENVIRONMENT

All municipalities agreed that water services risk is linked to- and integrated with a number of broader risk categories within the municipal environment. The DMs regard an integrated risk management approach as ideal in order to influence informed decisions and to protect the gains made in terms of water services delivery over recent years, including that of investment in capacity building. The municipalities felt that water services risks link with a number of broader categories risk, as summarised below:

Table 11: Risk linkage in the municipal environment

Risk Category	Number of DMs confirming these to be the most prominent risk category associated with water services
Economic	0
Financial	2
Social	3
Environmental	1
Human health	3
Combination of the above	3
Other	0
Specific triggers	▪ Baby deaths ▪ BD/GD program ▪ Agricultural community ▪ Social risk is regarded to be the most effective risk type to obtain Councillor support

In general, none of the municipalities felt that risk information or plans are considered at the appropriate level in the municipalities. WSP and W_2RAPs are in general, not informing planning documents or budgets such as the WSDP, IDP, SDBIP, asset registers, skills development plans, masterplans or integrated organisational risk plans. It would therefore, appear as if an integrated risk-based approach is not adopted as best practice in the participating DMs, as per the individual contributions made by the DMs in the sections following hereunder. This view is consistent for the capacitated, non-capacitated and reference DMs who participated in the study.

4.2 UPTAKE OF RISK-BASED CAPACITY BUILDING IN THE MUNICIPAL ENVIRONMENT

Joe Gqabi DM

Joe Gqabi appears to have benefitted significantly from the risk-based training and capacity development initiative offered by WRC in 2015/16. The main benefit from the support project was in terms of the practical implementation of risk management, i.e. using the risk matrix, determination of priorities and establishing Critical Control Points (CCPs). The DM could however, benefit from further support to set up

risk tracking systems and from independent audits of their risk processes on a continuous basis (every year or two years).

The Joe Gqabi team was found to be knowledgeable and inquisitive. They place high regard on water quality and management of data. There still seems to be a bias towards drinking water quality, with wastewater taking a lesser priority. This rationale is purely based on the perceived higher risk and impact of drinking water quality on human health, especially following the baby deaths in 2011 and again in 2015.

Two responses were often posted during the interview by the DM representatives: 1) 'to clarify the meaning of specific terminologies'; and 2) 'what does other municipalities do'. These questions indicate that the DM engage on a level of readiness to standardise risk-based terminology and is open to best practices and learnings from other municipalities. Professionalisation is a key driver and motivator for the technical team.

It is however, evident that risk management is not a living philosophy in the DM, despite the work that is done on ground level. The main reason is the interruption of the BD/GD audit programme by the Regulator, which assisted the DM to prioritise, measure- and incentivise performance. Due to challenges pertaining to time pressures and lack of staff, risk management is not a priority. Top management are not closely involved and reportedly view risk management to be a technical matter. Internal auditors are involved during the mid-year budget review, but not directly with the risk processes in the water services department.

Chris Hani DM

Risk assessment and planning is conducted on operational level by the technical risk teams, with limited participation from senior management (with the exception of the WSA Manager). These plans do not have a platform to be presented, be approved or to influence decision making on administrative, financial or political levels. The 'silo effect' further impacts on risk management not being implemented, despite the highlighting of critical risks. This lack of engagement seems to leave the ground team despondent as their efforts to update risk-based plans are not achieving fruition in terms of implementation.

It is clear that a number of individuals take huge pride and responsibility in their plants' performance and progress. A variety of opinions and levels of accomplishment can be noticed across the different treatment facilities and their respective teams. This 'divided' level of operations makes it difficult to analyse the DM as a collective, since many variables are present. The role of the Blue/Green Drop previously served to reflect on each water services system individually and no replacement for the Drops have since been identified.

The Chris Hani team was found to be inquisitive and engaged actively in the mock BD/GD assessment. There still seems to be a bias to drinking water quality, with wastewater being a lower priority and often not funded despite the critical risks listed in the W_2RAP.

The pilot project had a direct impact on the ability and confidence of the DM team to conduct their own WSP and W_2RAPs internally. Although the mock assessment did not allow for a detailed audit on system by system basis, the indicative results suggest that the quality of the in-house WSP and W_2RAPs improved after 2016.

It is however, evident that risk management is not held in high regard nor used to inform plans and decision taking in the DM, despite the work that is done on ground level.

Zululand DM

Zululand DM was represented by a diverse and knowledgeable team from management, the service provider (WSSA), Human Resources and IT/data management. The team was not convinced that the pilot project contributed significantly towards in-house capacity or capabilities. The Blue/Green Drop audits were found to be a more progressive game changer and driver of performance and risk mitigation.

Risk management is not well institutionalised in the DM as organisation. The breakdown of the BD/GD regulatory program, combined with the continued political changes, have a significant impact on the DM's motivation to drive risk management. Good work is still continuing in the field, including the update of risk matrixes, etc., and supported by progressive information and data management. However, the municipality's priorities are not informed by risk-based information and no reporting against risk performance is implemented.

Amajuba DM

Amajuba gained significantly from the risk-based training and capacity development initiatives, and the technical team are appreciative towards WRC for the positive impact of pilot project TT 693. This impact is particularly evident from the confidence that the technical team has to conduct risk-assessment in-house, without the support of external specialists. They could however, benefit from further support to set up tracking system to monitor the effectiveness of their (limited) risk implementation actions, as reported in WRC Project TT 693 (2016).

Staff retention is fairly good in the DM, however, new members have joined the team since 2015/16 and are in need of risk-based training, whilst existing team members expressed the need for refresher training. An independent review or inspection process would benefit this DM significantly for 2 reasons: i) the peer review and professional interaction serve to share knowledge and stimulate further work, and 2) independent check and verification process carries weight with decision makers.

Similar to other DMs, it is evident that risk management is not a living philosophy in the DM, despite the effort at ground level. The water services team does not have the necessary platform to present to Council or the Portfolio Committee. As result, decision making, budgets, etc. are not informed by risk-based plans or priorities. Senior management is not part of the risk processes. The role of the Director would be valuable in attaining collaboration and unity within the organisation (current HOD is acting). The role of Champions and a passionate technical team provide a commendable basis for future work and progress. The role of the Internal Auditor could be a potential stimulant to fast-track risk-coherence on organisational level.

uThukela DM

uThukela differed significantly in their approach to risk management, compared to other participating DMs, which made for a particularly interesting case. In the absence of the Blue/Green Drop regulatory audits, the DM adopted the BD/GD principles and KPIs as an internal standard, which serves to drive and sustain risk management. The uThukela risk team is possibly the most inclusive teams of all the participating municipalities in the study. The role of the General Manager and a dedicated united team are instrumental in their success. The regular reporting regimes, coupled with the involvement of the Risk Officer and Internal Auditor, drives performance and risk management. The future role of Umgeni Water as WSP will be a key factor going forward, but already, a strong and cooperative relationship exist across the WSA and WSP, with a common understanding of the BD/GD and risk driven imperatives.

A key challenge still remains in terms of the review and sign off of risk plans at Council level. The need for training of the Councillors has come to the fore during the interviews, with the recommendation to conduct training in isiZulu, as experience has shown this approach to be highly effective.

The DM team clearly takes pride in their work, but acknowledge constraints in terms of budget and funding the implementation of risk priorities. The role of the Blue/Green Drop previously served to focus and rewards the efforts by the DM team, and whilst an internal BD/GD system has been put in place, it still does not replace the role of the external Drop audits and the constructive guidance by highly competent DWS Drop Inspectors.

No direct link could be established between the pilot project and the progression in risk mitigation management in the DM. However, the mock assessment indicated that the quality of the in-house WSP and W_2RAPs improved after 2016.

Harry Gwala DM:

The Harry Gwala team could not reflect on the pilot project, since the current team were not part of the project and the previous Champion did not hand over the materials or transferred the knowledge gained. Previous efforts by the DWS to support risk management were regarded as valuable. This is no longer taking place since the suspension of the Blue/Green Drop programme. The current focus is on water use efficiency, with COGTA providing training and capacity building. The technical team shows a healthy appetite for learning and new knowledge, as was evident from their positive interaction during the mock BD/GD assessments and request for more information. The DM would benefit from capacity development in all aspects of the risk management process and use of WRC tools, which is currently not being applied.

It is evident that risk management is not practised or integrated in the DM, despite the formulation of the WSP and W_2RAP and the approval thereof by Council. The limiting factor appears to be the budget, which is not only limited but is also managed by the finance and risk departments, who is not involved with the risk assessment processes, urgencies or priorities. The DM is currently engaged in business rescue processes with the Province. The positive roles of the Municipal Manager and Mayor were mentioned as an enabling factor.

uMzinyathi DM

The technical person representing uMzinyathi was knowledgeable and hands-on, albeit under significant pressure to attend to urgencies in the field. Management was not present during the meeting and was represented by an administrative officer.

The results of the study indicate that risk management is not a standard practice and does not inform decision making. The pilot project TT 693 did not deliver sustainable results, mostly because the main person involved in the capacity building project, i.e. the Water Services Manager, was suspended with no contingency planning in place. The takeover of uThukela in 2013 seems to have placed strain on the DM and stability is yet to be reached.

The knowledge surveys were completed in a truthful manner and indicated a low risk knowledge. Risk-based support should start from scratch if the DM is to re-institutionalise risk planning and management as best practice. Although a significant increase in operational and capital budgets is noted, these resources does not translate or link to a risk management portfolio of the DM. The absence of senior management and a Champion, as well as lack of involvement of the water services Councillor, may be contributing factors.

Amathole DM

Amathole DM was not a recipient of risk-based support and capacity building during pilot study TT 693, based on the capacity and processes already in place at time of the study. With the continuation study, all senior managers were present during the interview, which was not the case with the other participating DMs. Whilst the municipality was facing hardship in terms of business resuscitation and other institutional difficulties at the time, the team reflected positively on the gains made over the past years in terms of water services risk management.

Significant progress were made in terms of identifying pertinent risks such as energy efficiency, sludge handling, pumpstation management and appropriate technology applications by the in-house team. The team members were clearly on par with the principles and application of risk management and contained significant capacity in-house.

Similar to other DMs, risk management has not been fully integrated into the organisation and no new investment had been made into risk-based capacity building. The key constraints associated with water services delivery was mostly relating to governance aspects, which again impacted on the implementation of risk mitigation and the uptake of risk management within the broader institution.

4.3 MUNICIPAL PARTICIPATION IN WATER SERVICES RISK MANAGEMENT

An analysis was conducted of the respective individuals who participate in the continuation study, as a representation of the persons closest involved in water services risk management in the municipalities. The following statists indicate the level of participation:

- ✓ A total of 47 persons participated in the risk impact analysis of 2018, via interviews, BD/GD assessments and completion of the risk impact indicators;

- ✓ 37 persons completed the Knowledge Surveys on WSP and 37 for W_2RAPs in 2018, compared to 29 (WSP) and 23 (W_2RAPs) in 2016.

The table below lists the job titles of the persons who participated, with the matching (proposed) OFO job titles, at time of the risk impact analysis of 2018. The relevant OFO job titles were extracted from a comprehensive list of OFO job titles for the municipal sector, as available at time of the study from the EWSETA (Annexure F).

Table 12: Job positions involved in risk-based planning study in 2018, with comparison in current job titles with SETA proposed OFO job titles

District Municipality	Current Job Title	Proposed OFO Job Title	Participants (#)
Eastern Cape			
Amathole DM	General Manager WSP	Research & Development Manager	2
	Assistant Manager	Assistant Water Service Manager	4
	Manager Water	Water Service Manager	1
Chris Hani DM	Water Quality Technician	Chemistry Technician	9
	Manager	Water Service Manager	2
	Water Officer	Water Quality Officer	1
Joe Gqabi DM	Manager: Water Quality	Water Services Manager	1
KwaZulu-Natal			
Amajuba DM	Process Technician	Chemistry Technician	3
	Superintendent	No Title	1
	Assistant Director	Assistant Research & Development	2
	Process Controller	Water Process Controller	1
Harry Gwala DM	Water Governance MS	Research & Development Manager	1
	Superintendent	No Title	1
	Area Manager	Water Production and Supply Manager	1
UMzinyathi DM	WSA Officer	Communication Manager	1
	D&M Manager	Facilities Manager	1
uThukela DM	Acting Manager WSA	Acting Water Service Manager	3
	BDS Compliance Officer	Compliance Officer	1
	Lab Technician	Geophysical Technician	3
	GDS Compliance Officer	Compliance Officer	2
	Risk Manager	Organisational Risk Manager	1
Zululand DM	Consultants	Consultants	1
	WSA Manager	Water Production and Supply Manager	1
	Operations manager	Finance Manager	1
	Dep-director Bulk Services	Water Production and Supply Manager	1
	Process Controller	Water Process Controller	1
TOTAL			**47**

The order of participation can be seen from the following bar chart, with the Chemistry Technicians making up the bulk of the participants (12 of 49). These positions are known as Process Technicians and Water Quality Technicians in current job descriptions. The next order of participants are Water Service Managers (current, acting and existing), who are currently known as Water Quality Managers or Water Managers (13 of 49). The position of Plant Superintendent has not been allocated with an OFO title as yet.

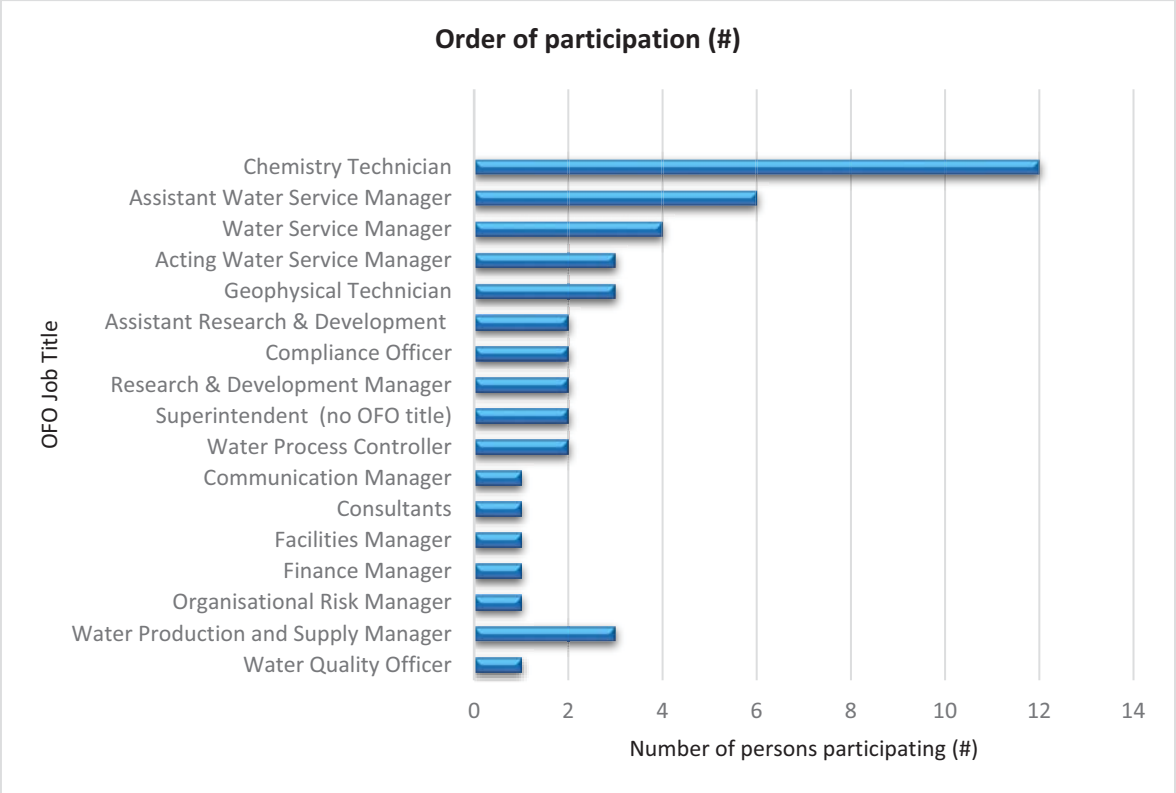


Figure 17: Participation in risk management from a Job Description / Titles perspective

5. TRENDS AND COMPARISON OF STUDY RESULTS

The following sections summarises and compares the results obtained from the various risk impact indicators.

5.1 RISK VULNERABILITY

The RiskQ tool was applied during the onset of Project TT 692 in 2014, and again during the 2018 risk analysis. A 2016 result set was not available, as no assessment was concluded at project close-out. The tool consist of a series of questions and answers within specified risk categories.

The RiskQ results present a view of the municipalities' vulnerability within these risk categories, i.e. the formation of a risk team, the implementation stages, and completing the cycle with signoff of plans by the senior management (Annexure B). The RiskQ assessment was done by the DMs as a self-analysis, and does not present the WRC specialists views.

5.1.1 WATER SAFETY PLANNING

The RiskQ tool was used to compare the risk vulnerability of 8 DMs within 8 risk categories, for 2015 and 2018 respectively. The following generic trends from 2014 to 2018 are observed:

1. *WSP team*: most DMs felt that they made substantial improvement in compiling a more diverse risk team. This self-evaluation is not entirely consistent with the current study's findings that most municipal risk teams comprise mostly of technical staff, with limited/no involvement by senior management, external parties (e.g. DWS) and Councillors.
2. *System assessment*: a marginal improvement from 2014 is noted, with this aspect having a low to moderate risk vulnerability.
3. *Risk assessment*: most municipalities recorded that they made substantial improvement in the ability to assess the risks in the field. This is consistent with the findings of the study which shows that significant value was derived from the capacity building project where the identification and rating of risks were demonstrated (on-site and in theory).
4. *Control measures and corrective action*: municipalities assessed themselves to have low to moderate vulnerability in these areas. This finding is not consistent with the interview results which indicate that some municipalities battle to identify appropriate control measures, whereas almost all municipalities battle to implement the corrective actions.
5. *Monitoring and evaluation of risk*: municipalities feel that their risks are moderate in terms of the monitoring of risks. This self-assessment is not consistent with observations during the interviews, which indicated that monitoring and tracking are a challenge in need of further specialist support.
6. *Management and support programs*: municipalities note a substantial improvement in their management functions and programs which support risk management. This view contradicts the results from the interviews which found management to be mostly absent during the risk management process, and whereby support for risk-based planning and resources for implementation is limited.
7. *Documentation and communication*: this aspect is rated as a low to moderate risk, with municipalities overall being confident that records and communication have improved since 2014.

This self-assessment is not consistent with the interview input where reporting does not contain deliberate records of risk mitigation, nor signed or approved risk plans;

8. *Water Safety Plan review:* municipalities rate themselves to have improved on this aspect. This risk remains the most vulnerable area of the WSP process with 62% high to extreme vulnerability.

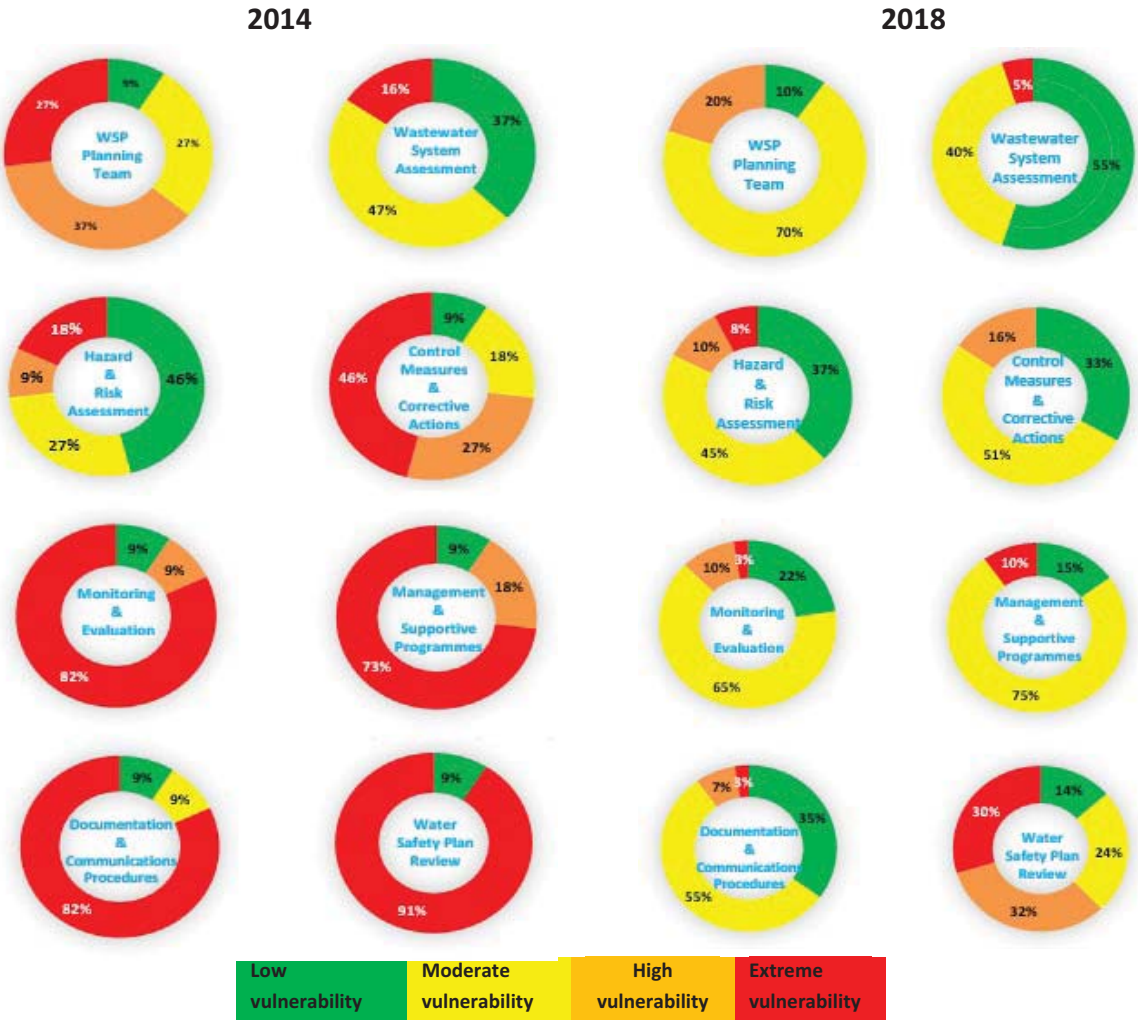


Figure 18: Comparative analysis between the WSP Risk Vulnerability results of 2014 and 2018

5.1.2 WASTEWATER RISK ABATEMENT PLANNING

The following risk vulnerabilities are observed for 2014 compared to 2018 for the 8 District Municipalities:

1. *W_2RAP team*: substantial improvement is noted in compiling a more diverse risk team, with the 82% extreme/high vulnerability reduced to 16%. This self-assessment is not consistent with the results of the interview which indicated that W_2RAP teams consist predominantly of technical members.
2. *System assessment*: an improvement from 2014 is noted, with the low/moderate vulnerability of 67% in 2014 improving to 80%; leaving only the balance in high risk vulnerable space. This positive outlook is not entirely consistent with feedback whereby external expert support is requested to size and describe the process units in more detail.

3. *Risk assessment*: this vulnerability remains similar for 2014 (9% extreme vulnerability) and 2018 (10% high/extreme vulnerability).
4. *Control measures and corrective action*: this vulnerability improved substantially, from 91% high vulnerability in 2014 to only 26% in 2018. This finding is not consistent with the interview results which indicated that some municipalities battle to identify appropriate control measures and most municipalities find implementation of corrective actions to be challenging.
5. *Monitoring and evaluation of risk*: municipalities feel that they have low/moderate risk in monitoring their risks. The self-assessment profile is not consistent with the interview results, which indicated that monitoring and tracking are a challenge in need of external expertise and further support.
6. *Management and support programs*: municipalities rate a substantial improvement in management functions and programs which support risk management. This reflection contradicts the results from the interview which found management to be mostly absent during the risk process and whereby limited support and resources are mobilised to support risk-based planning.
7. *Documentation and communication*: the 2014 profile indicate a 91% extreme vulnerability, while the 2018 self-assessment indicate an improved 70% low/moderate vulnerability, leaving the impression of an overall confidence that records and communication improved substantially since 2014. This self-assessment is not consistent with the interview feedback where reporting does not contain deliberate records, communication or approved risk management reports.
8. *W_2RAP plan review:* An improvement is observed in this aspect, although the review process remains the most vulnerable area of the WSP process with 63% high to extreme vulnerability.

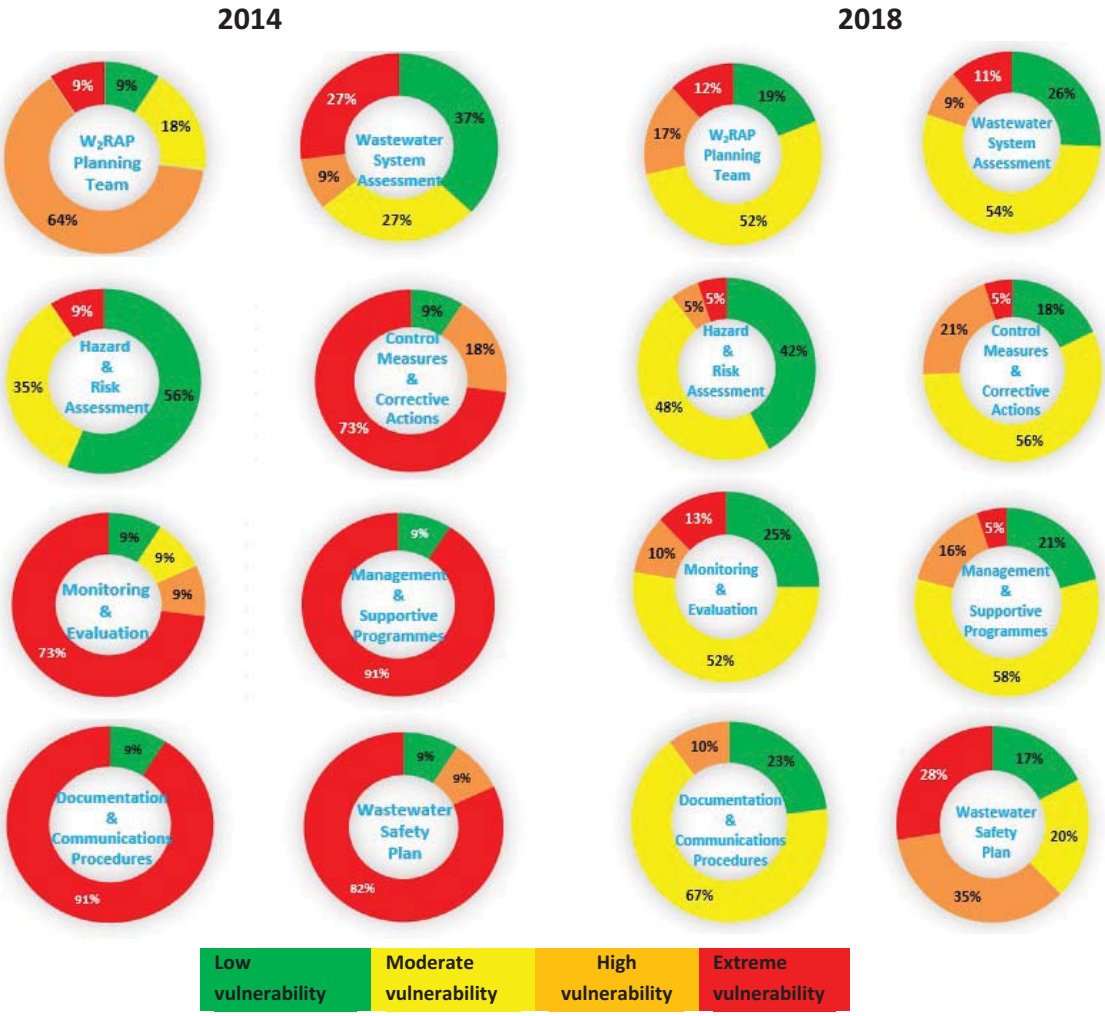


Figure 19: Comparative analysis between the W_2RAP Risk Vulnerability results of 2014 and 2018

5.1.3 INDEPENDENT RISK VULNERABILITY ASSESSMENT

The RiskQ self-assessment resulted in an overall positive reflection and reduction in risk vulnerability, indicating that the majority of municipalities feel confident and progressive in their risk management practices. Many of the self-assessment findings are not consistent with the findings of the risk analysis and interview results, e.g. lack of multi-disciplinary teams, lack of implementation of risk mitigation measures, lack of updated/signed WSPs and W_2RAPs, lack of involvement by senior management, limited capacity building in risk management, etc. Caution must be taken with an overly optimistic assessment of the risk vulnerabilities, as such results will not serve the higher purpose of identifying critical areas in the risk management process, thereby forfeiting the opportunity to correct these areas.

Ideally, RiskQ self-assessments should be coupled with a training session to illustrate the use of the tool. This exercise should be repeated as part of a verification process by an independent assessor. In testing this suggestion, a separate verification assessment was done during the continuation study. The RiskQ results of the independent analyst agrees with the self-assessments by the DMs that risk vulnerability improved from 2014 to 2018. However, it also reports a higher risk vulnerability when compared to the DMs self-assessment.

2018 – WSP self-assessment by DMs ***2018 – WSP Independent assessment by Risk Assessor***

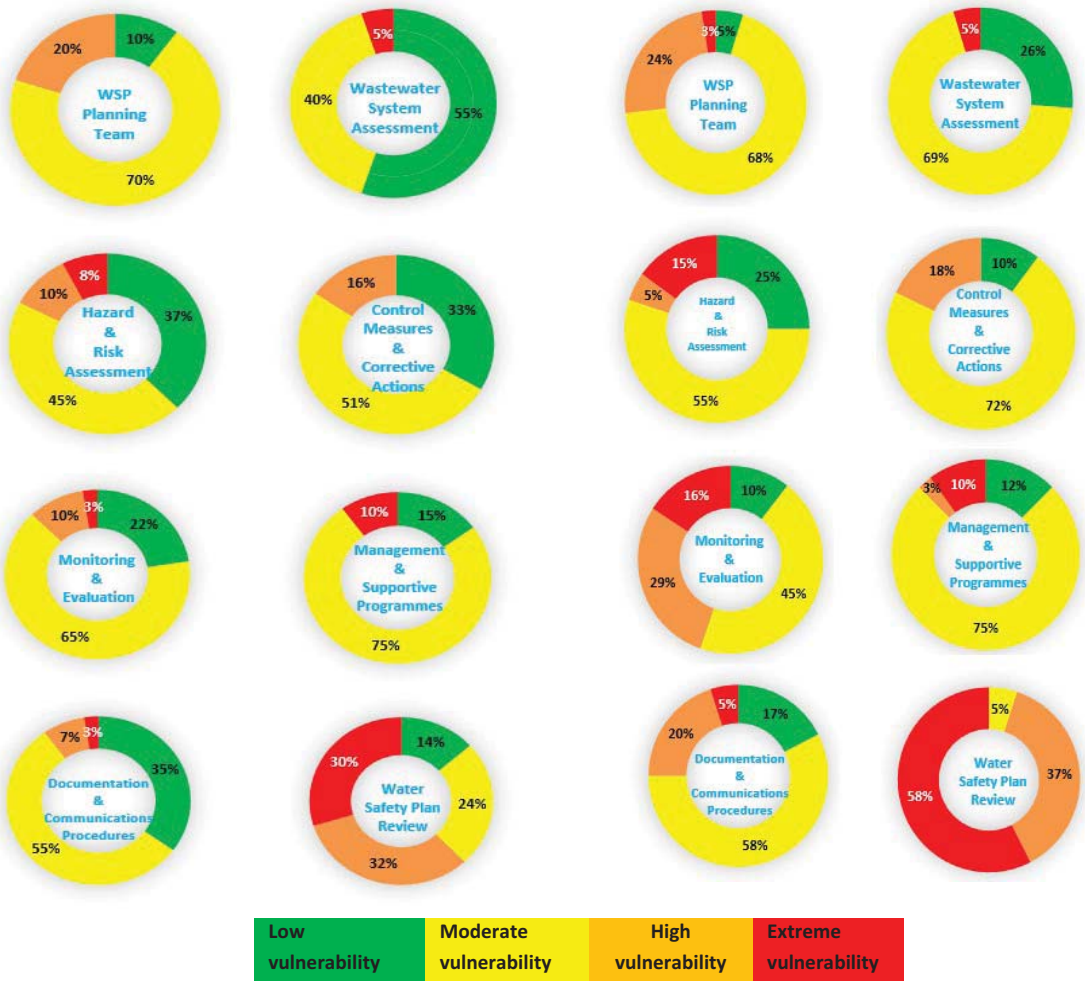


Figure 20: Comparative analysis between the 2018 Vulnerability Risk analysis (WSP) by the DM and the independent analysist

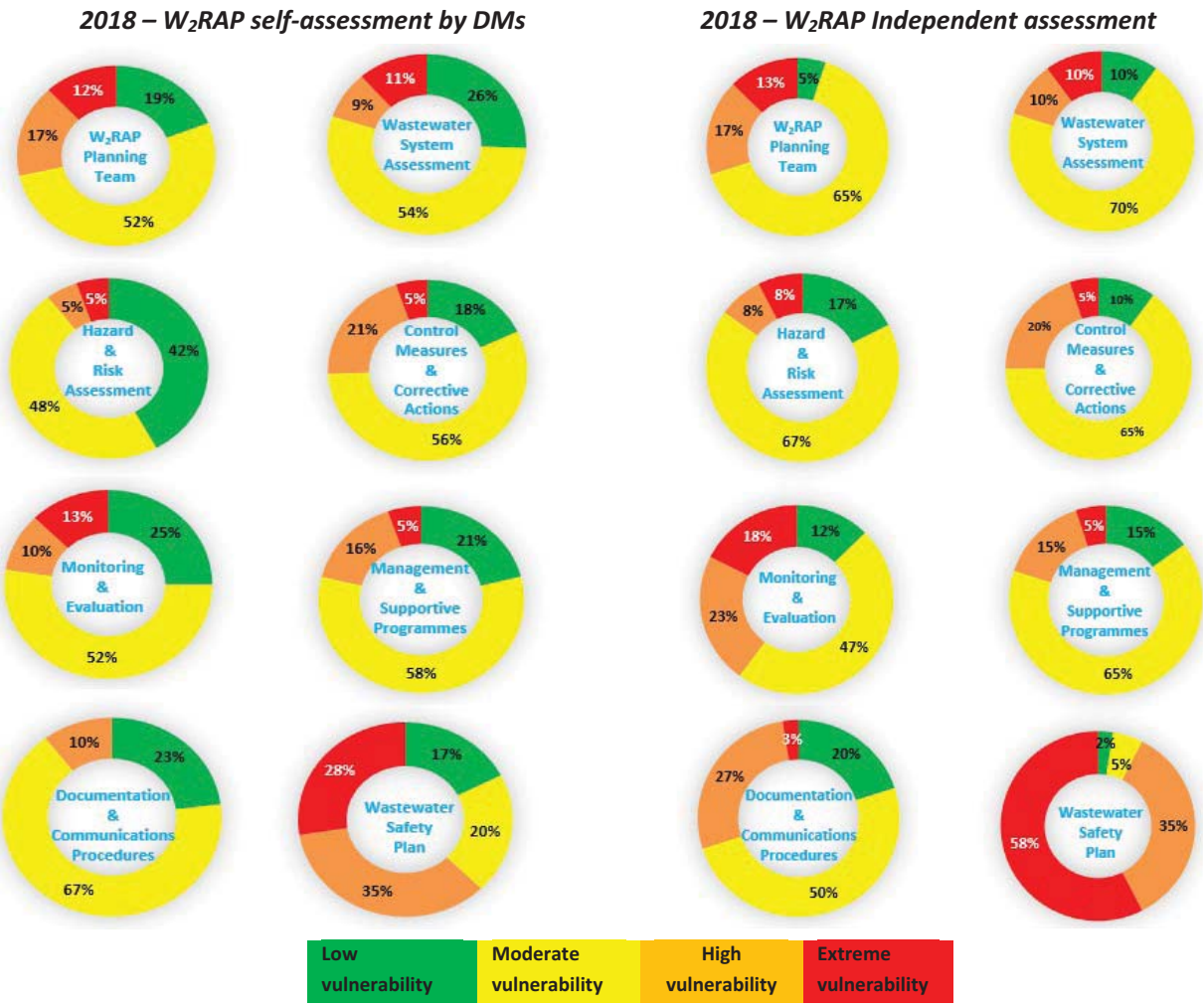


Figure 21: Comparative analysis between the 2018 Vulnerability Risk analysis (W_2RAP) by the DM and the independent analysist

Different reasons may explain a positive self-assessment profile:

- The DMs felt truly empowered and confident that the key aspects of risk management have been mastered and/or progressed significantly since the capacity building project;
- DMs tendency to risk aversion, with a sincere believe that progress are taking place despite the many challenges that are being faced in the municipal environment;
- Lack of understanding as to the specific requirements of each step of the WSP and W_2RAP process;
- Lack of understanding or attention by the person/s who completed the RiskQ assessment;
- Delegation of the assessment to a subordinate with a lesser understanding of the risk processes and not able to reflect the true status of each step;
- Anxiety by the DM staff in such case of a report not reflecting the DM or its staff in positive light, which may carry consequences within the organisation;
- Other.

More important however, is that both the independent- and self-assessments results ***confirm an overall improvement*** with risks profiles showing ***lesser risk vulnerability*** when comparing the 2014 and 2018 results.

5.2 KNOWLEDGE SHARING RESULTS

The survey questions used during the close-out of pilot project TT 693 in 2016 was used to evaluate the 2018 knowledge status of the municipal officials involved in risk management. The Knowledge Survey consisted of 20 questions, each pertaining to a different stage within the WSP and W_2RAP process (Annexure C).

5.2.1 WATER SAFETY PLANNING

The comparative results indicate that 80% of persons had a good understanding of risk management in 2016 compared to 60% in 2018. 80% of people reported a 'good understanding' in 2016, which reduced to 60% of people with a good understanding coupled with a larger percentage of people with a 'partial understanding' (35%) in 2018. This statistic supports the recommendation by the municipalities to receive periodic refresher training for existing staff and induction training for new staff. Another explanation for the finding is the fact that risk management is no longer firmly embedded and institutionalised in the DMs. The lack of day-to-day active practising of risk mitigation within the WSP and W_2RAP methodologies, will eventually result an erosion of previous knowledge and good practice if the staff does not experience an enabling environment.

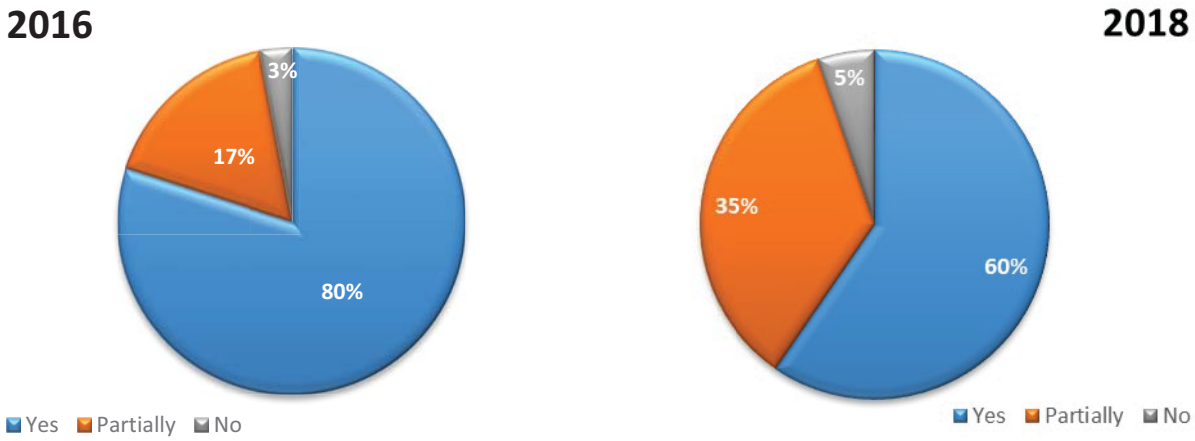


Figure 22: Comparative analysis of the knowledge on Water Safety Planning processes at time of Project TT 693 close-out in 2016 and again in 2018

5.2.2 WASTEWATER RISK ABATEMENT PLANNING

The W_2RAP knowledge profile differs from the WSP results. The comparison indicates that 51% of people had a 'good understanding' of wastewater risk management in 2016, which increased to 64% in 2018. The persons with 'partial understanding' remained similar over the two years (31 and 29%). A decrease of persons with 'no understanding' was found from 2016 (18%) to 2018 (7%). The municipalities did report that they found the WRC W_2RAP Guideline (2014) to be a valuable capacity development tool. Combined with the regulatory thrust of the Green Drop Certification programme, this seems to have been a stimulus to the positive capacity development in the wastewater services field.

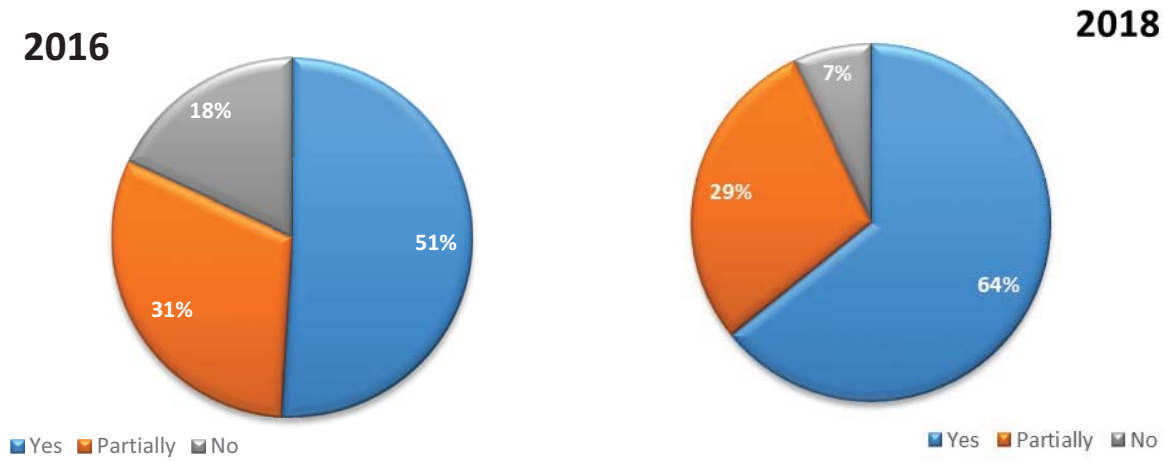


Figure 23: Comparative analysis of the knowledge on Water Safety Planning processes at time of Project TT 693 close-out in 2016 and again in 2018

Notable is that, despite the higher focus on WSP and drinking water in the municipalities, the improvement in knowledge and capacity was most prominent in W_2RAP and the wastewater side of the municipal water business. The efforts of the national Green Drop programme, coupled with the introduction of the W_2RAP guide, tools and capacity building initiatives, are some of the reasons for this positive momentum.

Unfortunately, the benefits associated with energy efficiencies, energy generation, beneficial sludge handling and reuse/recycle initiatives are still pursued, with only the 'reference municipality' having progressed in this regard.

5.2.3 COMPARATIVE ANALYSIS OF KNOWLEDGE SURVEY RESULTS

The Knowledge Survey consisted of 20 questions, each pertaining to a different stage within the WSP and W_2RAP process. The results of the comparative analysis highlight some general trends (Table 13):

- An overview of the period 2016 to 2018 indicate that 70% of persons (blue dot-line) had a good and improved understanding of the WSP processes, compared to 30% of persons (red dot-line) who had no/partial understanding thereof;
- That 59% persons (blue dot-line) indicated a good and improved understanding of the W_2RAP processes, compared to 41% (red dot-line) who had no/partial understanding thereof.

2016:

- 80% of persons indicated a good and improved understanding of the **WSP** processes, compared to 20% of persons who had no/partial understanding thereof;
- 60% persons indicated a good and improved understanding of the **W_2RAP** processes, compared to 40% who had no/partial understanding thereof.

2018:

- 60% had good understanding, and 40% had partial/no understanding of the **WSP** processes -this is a substantial reduction in knowledge from the 80% and 20% in 2014;
- 67% of persons had a good understanding and 33% had no/partial understanding of the **W_2RAP** processes – this is a good improvement from 60% and 40% in 2016.

Table 13: Comparison of level of understanding of WSP and W_2RAP in 2016 compared to 2018

Knowledge transfer timeframe	WSP		W_2RAP	
	Good knowledge (%)	No/Partial knowledge (%)	Good knowledge (%)	No/Partial knowledge (%)
Average 2016	80	20	51	49
Average 2018	60	40	67	33
Average 2016+2018	70	30	59	41

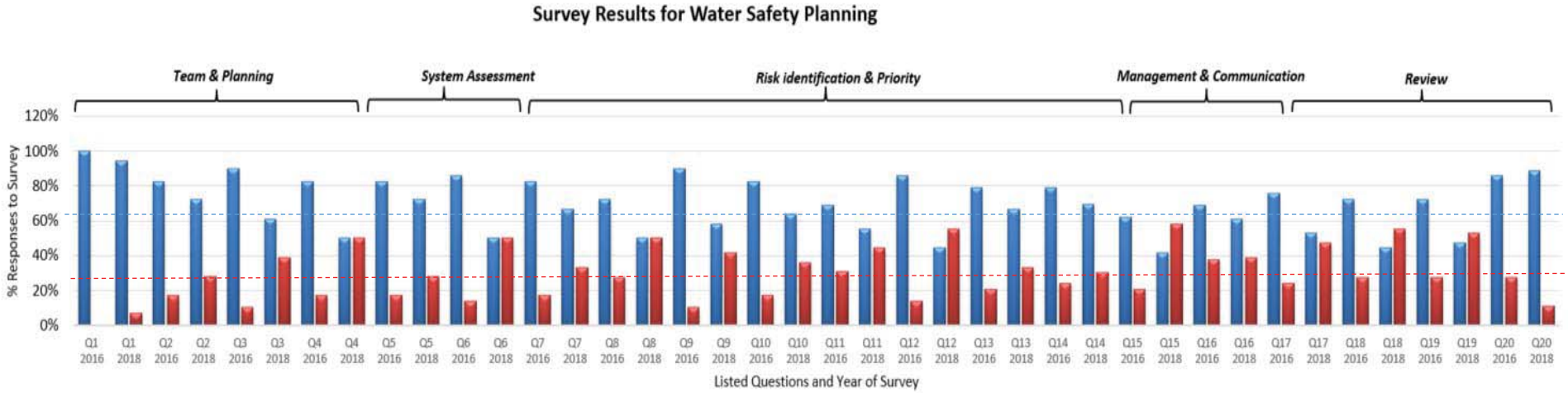


Figure 24: Comparative survey results for Water Safety Planning detailed per question

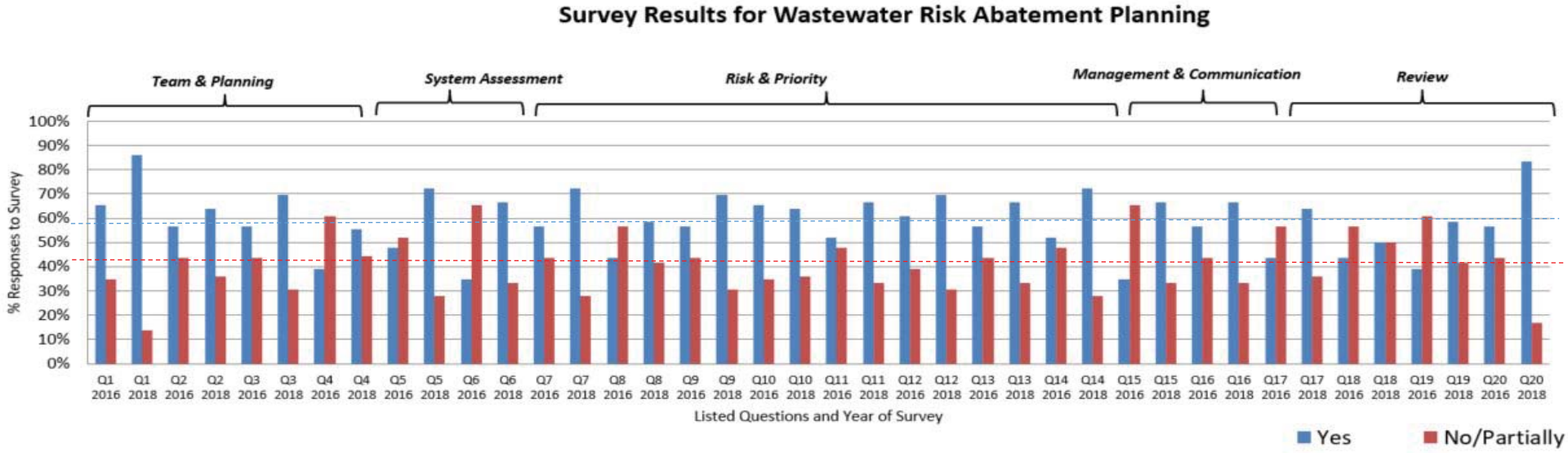


Figure 25: Comparative survey results for W_2RAP detailed per question

By condensing the data, it can be seen that the % of persons with good understanding of the WSP process declined from 2016 and vice versa, the % persons with no/partial understanding increased over the same period. Furthermore, the most prominent gaps in 2016 and 2018 were in the areas dealing with the requirements of Management and Communication.

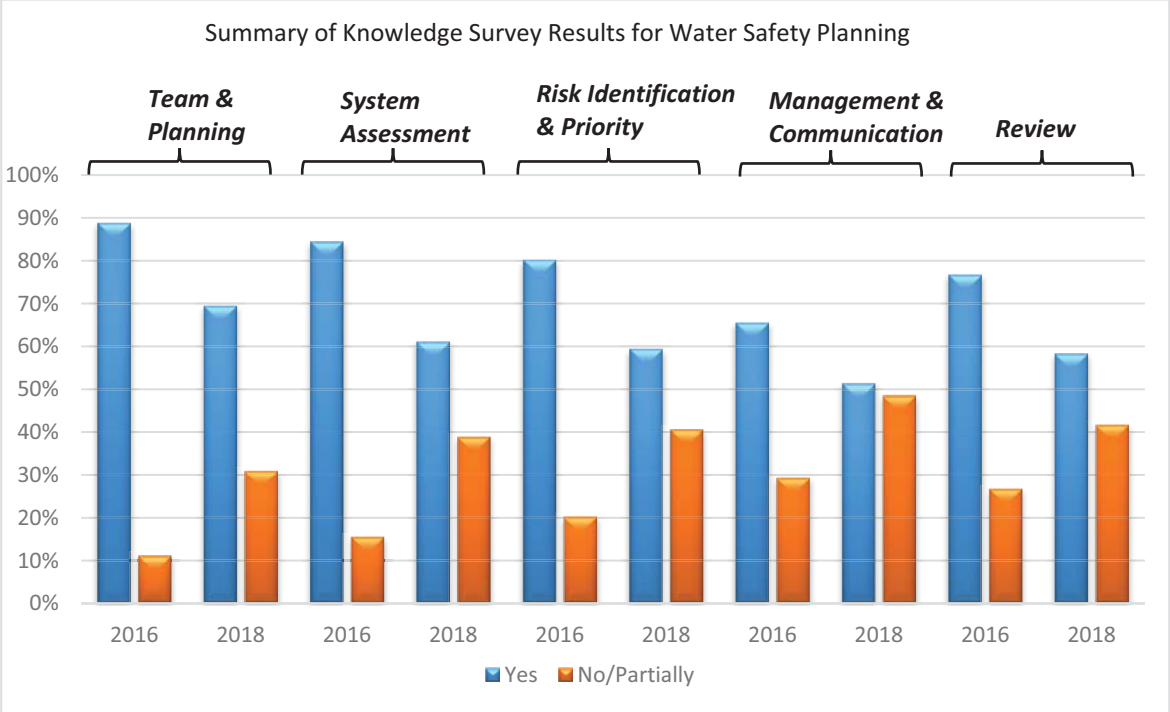


Figure 26: Comparative survey results for W$_2$RAP detailed per question

In terms of the W$_2$RAP processes, the % of persons with good understanding of the WSP process increased over the 2016 to 2018 period, and vice versa, the % persons with no/partial understanding decreased over the same period. Furthermore, the most prominent gaps in 2016 was spread across the first 4 elements of the process, whereas 2018 show the 1st element (Team & Planning) to be the areas with most pressing gaps.

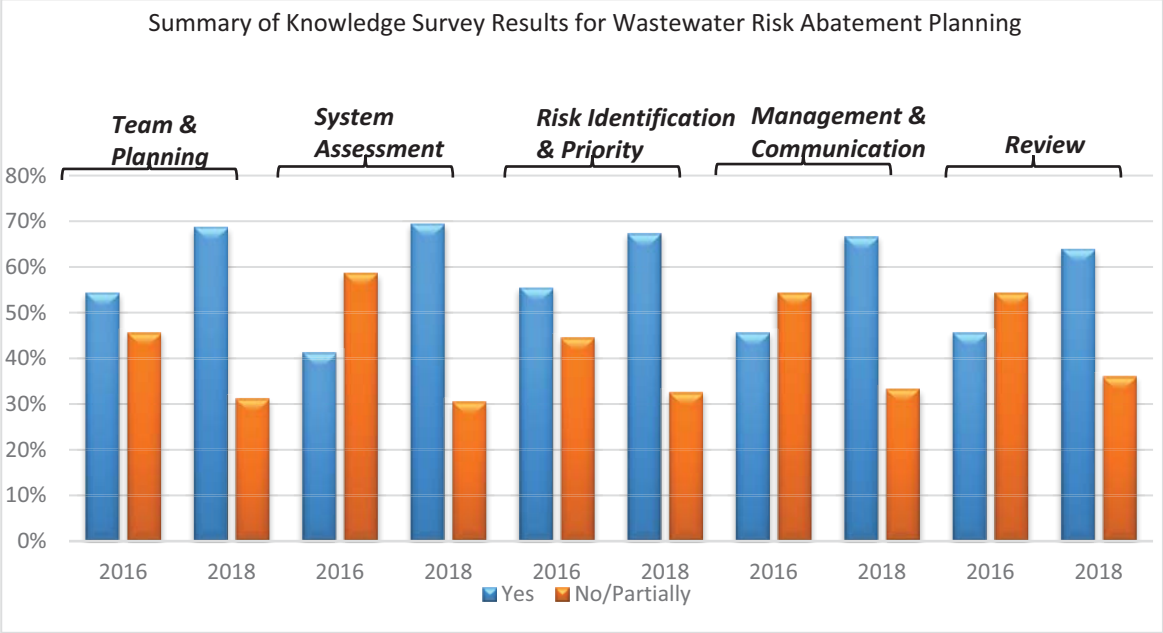


Figure 27: Comparative survey results for W$_2$RAP detailed per question

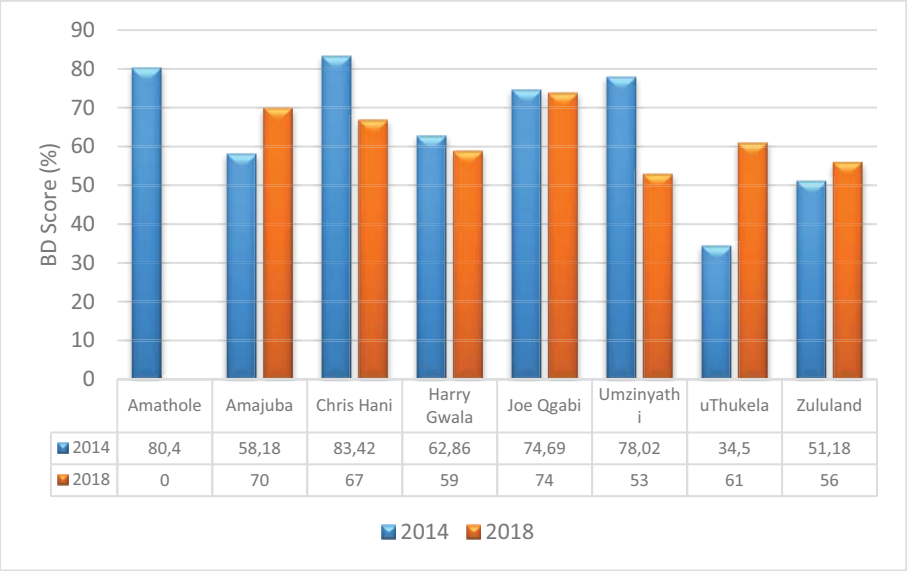
5.3 BLUE DROP, GREEN DROP AND RISK PLANS

As previously stated, the Blue- and Green Drop scores are widely accepted as a reliable indicator of the overall performance of a municipality in terms of its drinking water quality and wastewater services. A comparison of the published BD and GD results of 2014 and the (mock) Indicative BD and GD scoring of 2018, provides a valuable indicator of the progress or decline in overall performance during the assessment period.

Unfortunately, no Drop scores (actual or mock/indicative) were available during close-out of the pilot project (2016). It was therefore not possible to measure the direct impact of the pilot project on Blue/Green Drop progress or digress. However, the use of a simulation BD/GD assessment tool enabled mock Drop assessment and produced indicative BD/GD scores for each DM for 2018. The sections below discuss the results in more detail.

5.3.1 COMPARATIVE ANALYSIS OF BLUE DROP SCORES, WATER SAFETY PLANS AND BDRR: 2014-2018

The comparative results for 2014 to 2018 show an improvement in the Blue Drop score for Amajuba, uThukela and Zululand, whilst Joe Gqabi maintained its 2014 BD score. Blue Drop scores for Chris Hani, Harry Gwala and uMzinyathi digressed from 2014 to 2018.



	Amathole	Amajuba	Chris Hani	Harry Gwala	Joe Qgabi	Umzinyathi	uThukela	Zululand
2014	80,4	58,18	83,42	62,86	74,69	78,02	34,5	51,18
2018	0	70	67	59	74	53	61	56

Figure 28: Blue Drop scores for years 2014 and 2018

All DMs showed an improvement in their WSP scores (Criteria 1 of the BD audit). The Blue Drop scores are made up of different audits criteria, of which risk planning is one sub-criterion. No direct relation could be established between the WSP score and the Blue Drop score.

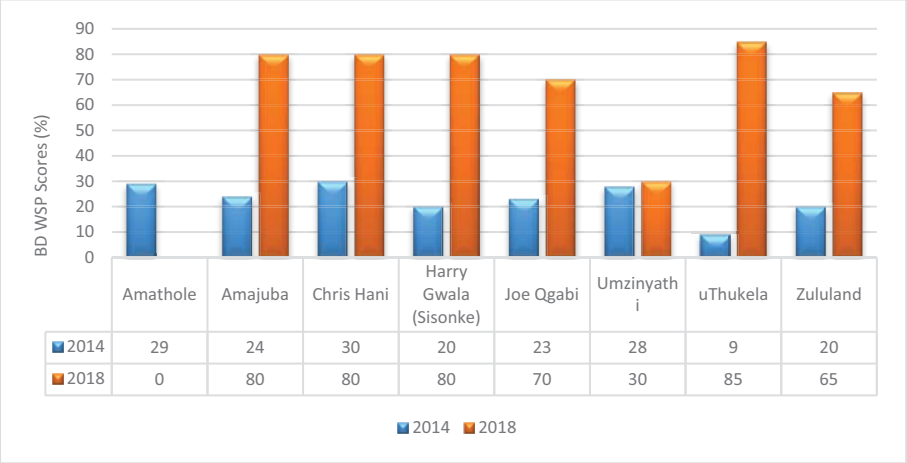


Figure 29: Water Safety Planning scores (Criteria 1 of the Blue Drop audit scorecard) for years 2014 and 2018

Blue Drop Risk Ratios (BDRR)

No Blue Drop Risk Ratio data was available for comparison with the above indicators. The DWS Blue Drop PAT scorecards were shared by the DMs with the risk analysis team, but consisted of information gathering questions only. No BDRR calculations were built into the spreadsheets.

5.3.2 COMPARATIVE ANALYSIS OF GREEN DROP SCORES, W_2RAPS AND CRR: 2014-2018

The comparative results for Green Drop performance indicated an improvement in GD scores of uThukela and Zululand, with Amajuba and Gqabi maintaining their 2014 scores. Chris Hani, Harry Gwala and uMzinyathi digressed as is evident by the lower Green Drop scores in 2018.

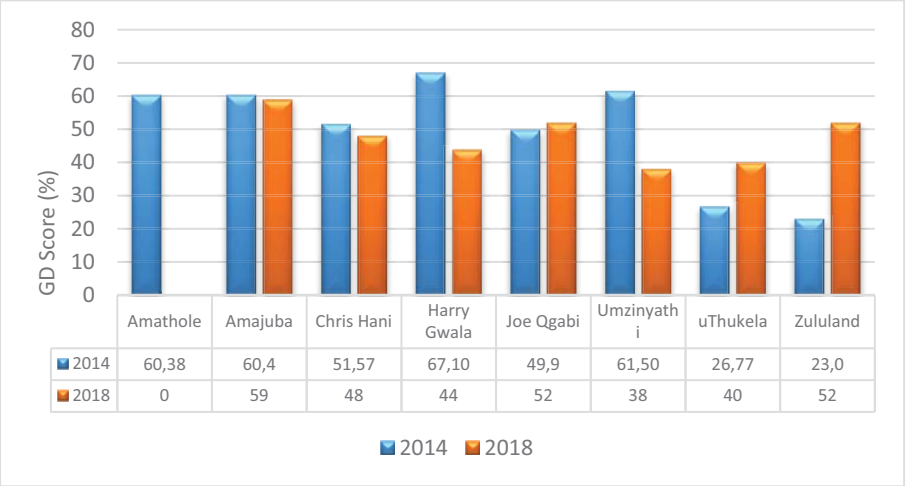


Figure 30: Green Drop scores for 2014 and 2018

Chris Hani and Zululand DMs showed an improvement in their W_2RAP scores, as per Criteria 1 in the GD audit scorecard. No direct relationship could be concluded between the W_2RAP and Green Drop score.

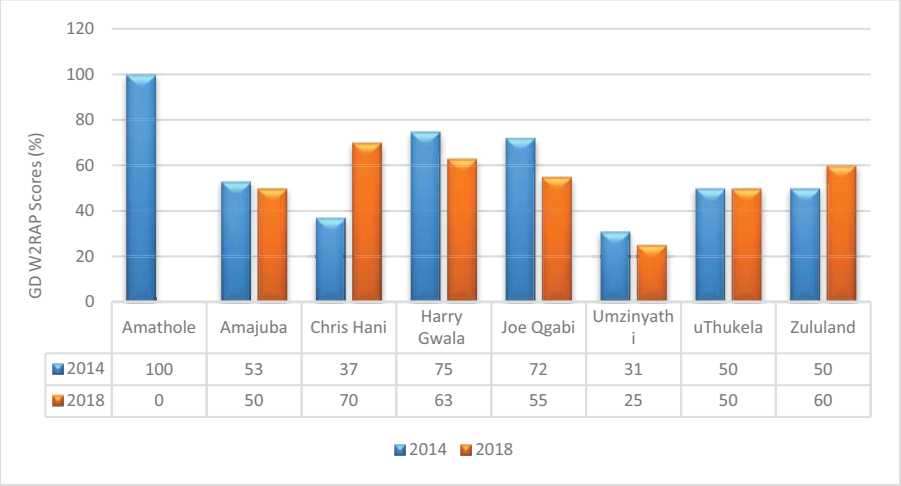


Figure 31: W_2RAP scores (Criteria 1 of the Green Drop audit scorecard) for 2014 and 2018

It is also observed that the DMs achieved a markedly lower scores for Green Drop and W_2RAPs compared to Blue Drop and WSPs. This result may be consistent with the results from the interviews that municipalities are still prioritising 'water in the tap', whereas less emphasis is given to wastewater services.

Green Drop Risk Ratios (Cumulative Risk Ratios – CRR)

Contrary to the Blue Drop PAT, the Green Drop PATs of 2016/17 provided information and calculated CRR risk scores. Chris Hani and uMzinyathi's CRR could not be calculated due to a lack of data. Harry Gwala and Amajuba showed a sligth increase (decline) in risk position, both still remaining in moderated risk space. Joe Gqabi showed an encouraging reduction in CRR and moved from moderated into low risk space (59 to 27%). Zululand also showed an improvement by reducing its CRR from 70 to 55%, thereby moving to a lower risk position.

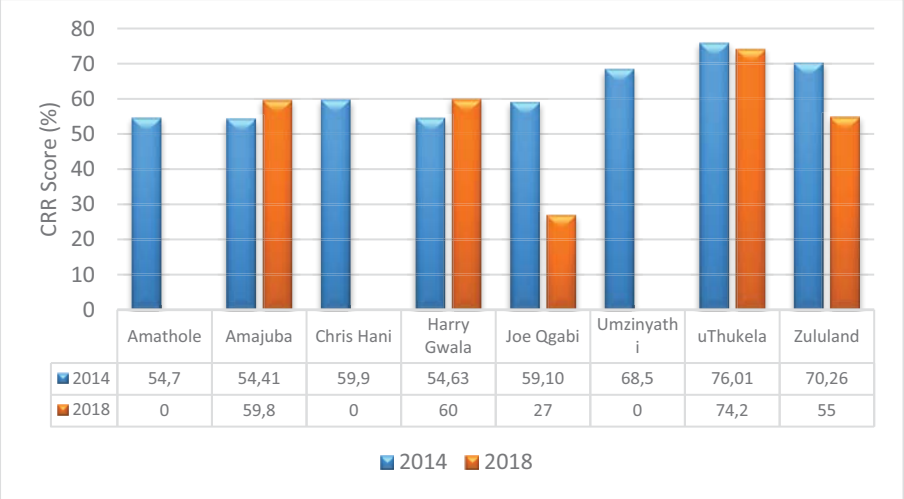


Figure 32: CRR movement from 2014 to 2018, for 8 participating District Municipalities

5.4 COMPARATIVE ANALYSIS OF WATER SERVICES PERFORMANCE FROM A RISK PERSPECTIVE

The results from the study were highly variable across the respective municpalities, as well as within the spectrum of indicators applied. The following comparative analysis extract the main stream results from this study, which essentially summarises the impact of the pilot project (Report TT 693).

Table 14: Analysis of the impact of risk-based capacity building by comparing the key risk indicators of participating District Municipalities:

#	District Municipality	24 Risk Indicators	Water Safety Plan			Wastewater Risk Abatement Plan				Sum
			Risk Vulnera-ble	BD%	WSP%	Risk Vulnera-ble	GD%	CRR%	W_2RAP%	
1	Amathole	*Reference DM – not part of pilot study*								
2	Amajuba	↑ (38%)	↓	↑	↑	~	↓	↑	↓	↑
3	Chris Hani	~ (42%)	↑	↓	↑	↑	↓	NI ~	↑	~
4	Harry Gwala	~ (38%)	↑	↓	↑	↑	↓	↓	↓	↓
5	Joe Gqabi	↑ (50%)	↑	↑	↑	~	↑	↑	↓	↑
6	uMzinyathi	↓ (54%)	~	↓	~	~	↓	NI ~	↓	↓
7	uThukela	↑ (54%)	↑	↑	↑	↑	↑	~	~	↑
8	Zululand	~ (42%)	↑	↑	↑	↓	↑	↑	~	↑
	Trend		↑	↑	↑	~ - ↑	↓	~	↓	↑

An overall comparison of the key risk indicators indicates that Amajuba, Joe Gqabi, uThukela and Zululand DMs have progressed in their risk management practice, potentially as result of increased or sustained capacity. One factor that set these DMs apart was the involvement by senior management and/or an enabling or supportive environment in terms of risk management.

Drinking water services appears to still enjoy priority in most DMs, with lesser attention to wastewater services. This can also be seen when comparing the overall positive results for Blue Drop (↑), compared to Green Drop (↓). However, the knowledge surveys showed that W_2RAP enjoys a distinct advantage over the WSP when compared to new knowledge gained.

The overall impact of the WRC TT 693 project could not be measured with a high level of accuracy. This was mostly due to the lack of baseline data and close-out statistics, as well as the absence of a measurement methodology specified at the commence of the pilot project. The pilot project focussed on the transfer of risk-based knowledge in the field in a learn-and-do approach. The measurement of impact of capacity building was not defined or specifically required from the support team. Capacity development should be a specific deliverable and appropriately scoped in future capacity building projects.

6. LESSONS LEARNT AND ITS IMPACT ON NATIONAL ROLL-OUT

A close-out session was held with the WRC TT 693 pilot project team to reflect and share learnings on the findings of the risk-based impact (continuation) study and its value in formulating a model for roll-out of future capacity building projects.

The respective research teams agreed that the following learnings were valuable contributions to conceptualise a national framework:

- The scope of work of a capacity building project must be well defined at inception phase;
- The project leaders and funding agencies need to reach agreement as to the deliverables and measureables from the project, and ensure that goalposts remain intact;
- Suitable tools must be used to identify the gaps, challenges and root cause facing the municpality in their services delivery;
- A set benchmark or baseline at the start of a project is imperative;
- Caution must be taken to address gaps with custom-made tools which may not aid the municipality;
- The level of capacity and readiness of a municpality to use the capacity building actions need to be assessed, and appropriate solutions/support must be aligned with the capability of the existing resources;
- The role of Councillors are of utmost importance, focus should not be on the delivery of visual infrastructure, but on the systems and processes that sustain these;
- The presence and buy-in of senior management in risk-based mangement practices are of paramount importance. Without top mangement support and drive, the ground staff will remain without a voice and means to implement, despite the good work that takes place on the ground;
- The devolopment of scientific means to 'measure' capacity building before and after a support project is supported;
- The discontinuance of the Blue- and Green Drop Certification programme was considered a significant set back for the support project, mainly because it was (is) a critical driver of performance and instrumental in continued measurement of progress/digress;
- Support projects must focus beyond knowledge dissemination (only) by doing structured training and measuring of knowledge imparted;
- In cases where support agenices develop tools, care must be taken to introduce the tools to the market place and to provide training to use the tools;
- The combined use of 'guidelines' and relevant 'tools' is a valuable package when supporting and building capacity in a municpality. These are best applied if combined with dedicated training events by knowledable experts, and by combining theoretical with site-based practical assignments.

In response to the question: "*What would you do differently in a capacity bulding project similar to Project TT 693, knowing the findings of the impact analysis?*", the pilot study team responded:

- Establish a suitable benchmark during the starting phase of a project;
- Conduct an intermediate assessment/s against baseline benchmark during the project execution;
- Return to the recipient of the support project to review progress and repeat knowledge sharing where setbacks are observed, repeat as often as needed over a longer period;
- Convince funding agencies to allow sufficient funding to support a longer term capacity building initiative;

- Signed letters by a muncipality does not necessarily translate to commitment by management to participate – involve appropriate sector players to obtain buy-in on senior management and Councillor level;
- DWS's failure to maintain a programme the likes of Green/Blue Drop should have been identified as a critical enabler and 'project risk' early on. This would have allowed for the development of a suitable tool or methodology to replace or replicate the Drop result.

The following recommendations are summarised from the viewpoint of the participating DMs in answer to: "*What should be done to improve capacity building in municpalities?"*:

- The Blue-and Green Drop programmes must be reinstated – these audits and results assisted to measure performance, motivate resources and attract senior mangement and Council attention, whilst the constructive input by the Lead Auditors served to build capacity and share knowledge and best practice;
- That municpal Internal Auditors must have an increasingly important role to play to sustain water services risk management and performance, and need to be more closely involved in WSP and W_2RAP processes;
- Support programmes must include periodic (independent) assessment of progress and be part of the initial project scope of work;
- The WRC and sector support projects must identify the actual gaps and needs of the municpality, and understand its complexities (i.e. political enviroment) , before responding with a support project;
- Support initiatives must respond to the root causes and well as the immediate scope of problems encountered – a custom-made solution is more often not the correct response and need to be adapted to suit the specific muncipal environment, systems, proccesses, dynamics and people;
- Council training is an absolute imperative, especially focussing on the systems and people that sustain service delivery, and not essentially and only delivering physical infrastructure that is in the ground;
- Refresher training is required to sustain risk-based capacity in municipalties;
- The role of DWS, COGTA and other sector partners in capacity building is highly valued, but have been reduced or suspended since 2014, which leaves DMs without any form of external verification or assessment or exposure to expertise – this capability need to be reinstated;
- Focussed training must take place after the release of technical guidelines, reports and tools – by introducing a (funded) train-the-trainer approach. This will ensure transfer of the capacity to champions, who again will extend broader reach within their organisations, thereby ensuring that the delegated official carry the responsibility for macro-reach capacitation within the institution;
- More lesson sharing events and documentation that focus on the theme: "What are other municipalities doing to address similar problems";
- Support projects must provide assistance to incorporate risk mitigation and tracking thereof into the WSP and W_2RAP;
- Sector partners must run education programs on the importance of saving water (e.g. communities still break water lines to form dams to water cattle); More programs which provide specialist support, e.g. conducting detailed Process Audits, network assessment and capacity;
- DWS must resuscitate their mandate and programs as Regulator, to enforce compliance. Currently, there are no consequences in events of failures or non-compliance.

- A support programme to identify funding sources and make submissions to fund risk implementation will be a meaningful enabler. DMs know their gaps and shortcomings, but do not have funding to address the mitigation measures.

The following barchart list the most important imperatives when rolling out capacity building projects to other municipalities, as recommended by the participating DMs:

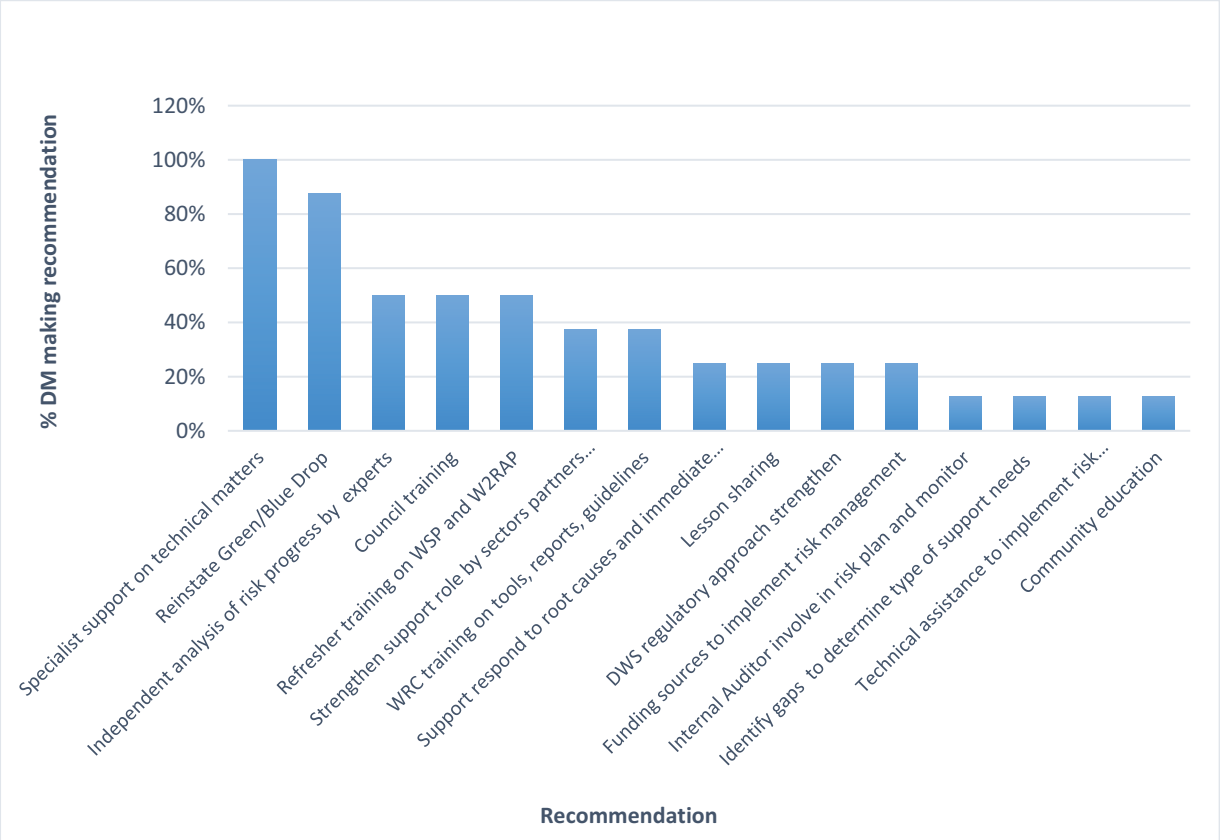


Figure 33: Prioritised list of recommendations to improve risk-based capacity building at other municipalities (by 8 participating DMs)

7. DEVELOPMENT OF A FRAMEWORK FOR NATIONAL ROLL-OUT OF RISK-BASED CAPACITY BUILDING

7.1 BACKGROUND

Literature is inundated with reference to the challenges facing municipalities in terms of their capacity to meet planning and water services delivery challenges in urban areas, but also in rural, small and medium-sized towns where local government capacity shortages are most serious (UN-HABITAT, 2014; Cities Alliance and UCLGA, 2013). Whilst the importance of decentralised capacity and the need for accelerated capacity building is emphasised in various publications (Cities Alliance and UCLGA, 2013; Lawless, 2015; NWSMP, 2018), the prospects and realities are that rapid urbanisation, water resource depletion and unsustainable revenues will outstrip the ability of capacity building initiatives to correct the balance and set water services on a firm positive footing.

Water and wastewater services are a critical and cross-cutting fundamental service that is linked to social well-being, economic health and environmental sustainability (NWRS-2, 2013). Enhanced expertise and sufficient capacity of municipalities is inevitable in this trajectory, as reflected in the SDGs and the SE4All initiatives of bottom-up solutions and decision-making (S4All, 2014; United Nations, 2015).

However, efforts to support municipalities with sustainable capacity building initiatives are at best, uncertain in terms of its impact, and at worst, ineffective where municipalities default to previous inefficiencies as soon as the support mechanism is removed.

Two models of support and capacity building initiatives are commonly found on the extreme ends, namely *the placement of experts and/or transfer of funds without necessary support.* These two 'extremes' are typically not yielding the required results and the developed capacity is mostly short-term, intermittent and lack sustainability (Bawakyillenuo, 2015). Other forms of support include formal training through masterclasses, workshop and presentations, development of supporting tools and documents, interfacing with local government levels through policy, pilot projects and infrastructure project implementation support (Mvula Trust, 2015).

The introduction of the Blue/Green Drop Certification by the national water regulator Department of Water and Sanitation, faired exceptionally well to drive local capacitation and professionalisation through the setting of incentive- and performance targets (WIN-SA Lesson Series, 2015). Sadly, the programme stagnated in 2014, with far reaching results in the water services sector (Interviews with 8 DMs, 2018). Despite indications that this programme will be reinstated to its former grandeur (NWSMP Call to Action, 2018), no replacement to the Drop audits has been introduced. The Drop programme are unique and not easily replaceable, as it has the structure and prominence to change an entire sector and inspire large scale capacitation through harnessing of the nation's significant resources.

One of the strengths of the DWS's Green/Blue Drop programme (2009-2014) was that the incentive-based regulation was supported by risk-based regulation (2012-current). The introduction of WSP and W_2RAP, and risk ratio measurement (CRR and BDRR), resulted in focused and prioritised action plans which succeeded to mitigate and address high risks, thereby addressing human health and environmental sustainability. The sector responded via the development of suitable guidelines and tools to ensure maximum uptake of risk mitigation measures within an environment where the Regulator publish

municipalities' water services credentials in public. The WRC-DST partnership was one programme whereby capacity building projects were rolled out in targeted municipalities since 2015. With the suspension of the Blue-Green Drop audit process in 2014, no measurement of impact of these projects could be concluded, resulting in the conceptualisation of projects aimed at analysing the impact of risk-based capacity projects, i.e. pilot project TT 693, and developing a framework to plan, structure and execute risk-based capacity building projects in the South African water sector.

7.2 BROADER WATER SERVICES CHALLENGES FACING LOCAL GOVERNMENT

The scale of capacity building need to be contextualised against the magnitude of challenges facing the municipal sector, in context of the national status. Consensus is widely reached that South Africa faces a challenging situation regarding the state of its water resources and responding to the ever increasing need for water services. The role and capacity of local government becomes under increased pressure to deliver against the nation's water agenda, whilst the existing situation is regarded as 'critical'.

Some key challenges published are: 56% of WWTWs are in crisis; 11% of bulk water infrastructure is dysfunctional; R900 billion is required to address the gap, SA will face a water deficit of 17% by 2030, climate change is posing real and pertinent challenges in terms of water risk planning; drinking water treatment plants are not consistently meeting SANS standards, especially in smaller towns; and billing and revenue recovery is a fundamental risk to most municipalities. Studies show that, although human capital is increasing in numbers in the market place, the quality of human capital is declining, which makes appointment of skilled staff, capacity building and mentor support a priority. Overall, the slow onset of systematic failure and collapse of institutions are evident, and need to be reversed by design and through dedicated resources.

(References: Lawless, 2015; National Water and Sanitation Masterplan: Call for Action: 2018; SCOPA, 2018; Auditor-General Report 2018).

7.3 GAPS AND OPPORTUNITIES

In order to develop a framework that will guide the roll-out of national capacity building projects in the water services sector, the lessons learnt from the WRC pilot- and impact analysis studies need to be considered:

1. Establish a baseline, benchmark or KPI at commence of the capacity building project with clear understanding of the expected impact of the project
2. Ensure that the KPIs are measured before, during, immediately after implementation of the project, and with specific intervals after project close-out (e.g. annually for 3 years, etc.). The 1st measurement is that baseline against which the project is measured, whereby the last measurement need to be a period of at least 3+ years to measure the impact over time.
3. Ensure that regular follow-up or mini-assessments are done to maintain momentum and interest in the municipality. Staff is likely to prioritise areas where they know that some form of measurement or assessment will be done afterwards, which may reflect on their performance.
4. Ensure a comprehensive briefing on the project scope of work, deliverables and expected outcomes.

5. In the case of partner departments having combined management oversight ito a capacity building programme or project/s, ensure alignment of expectations between partner organisations with clear objectives, agreed methodology, expected outputs, as well as clear roles and responsibilities to avoid misunderstandings within the project teams or recipient municipality.
6. Support projects must focus beyond knowledge dissemination (only) to include structured training and measuring of knowledge imparted during the support project.
7. Publication, special forums and open sharing of new knowledge and positive municipal experiences are powerful motivators for others to follow.
8. An urgency be put on training for Councillors to understand the systems that sustain water services (i.e. risk mitigation), as opposed to only paying attention to putting the visual infrastructure in the ground.
9. Capacity building agencies need to take caution to first understand the complexities of the municipality and avoid pursuing a standard or generic approach which may not fit the specific needs of the recipient municipality.
10. Despite some negative perception and rhetoric that municipalities are not productive entities, most water services officials operate under severe operational and political pressure, with limited resources to their disposal. A detailed grasp and appreciation of these constraints is important before formulating a capacity building work plan.
11. Longer term funding and consistency in the capacity building initiatives are requisite if sustainable capacity and solutions are to be institutionalised.
12. The lack of senior management involvement in risk-based water services planning is a significant challenge facing the municipal water sector. The risk impact study showed a clear distinction where senior managers, and Internal Audit Officials, played a prominent role in risk-based water services planning and implementation.
13. It is imperative to define terminologies that may have multiple meaning to persons from different disciplines, to ensure common understanding.

7.4 PRINCIPLES AND CONSIDERATIONS FOR THE DEVELOPMENT OF A FRAMEWORK

Based on lessons and experience gained through sector initiatives and the capacity building initiatives, the following methodological principles have been identified:

- Capacity building should address the gap between existing- and the required skills set whereby the participants will be able to fulfil their workplace roles and functions;
- Training should be needs- and capacity-based rather than driven by programmes and modules with pre-designed content;
- Capacity building is not a once-off event but a 'ladder' where information access, facilitation and empowerment, technological development, mentorship role of consultation/extension advisors and programmed learning and important pillars for increasing of capacity (Water Wheel, 2107);

Figure 34: WRC model for capacity building (WIN-SA, 2013)

- Capacity development should follow a developmental and differentiated approach:
    - '*Developmental*' meaning that the capacity of the participants should be built incrementally to follow a ladder from 'struggling -> learning -> developing – performing -> mastery' (Refer: WRC model)
    - '*Differentiated*' meaning that different types of capacity building will apply to learners who are on different developmental levels. Thereby, the 'one size fits all' methodology become redundant and is replaced with a targeted approach based on the needs of the participant.
- Municipalities should be engaged in identifying its own training needs within the framework of its functional requirement. However, guidance need to be provided on the broader context of the initiative to ensure that local priorities of the municipality, the capacity needs of the participant, and the objectives of the regional/national programme can be satisfied;
- Training methodologies should be driven by both the content and the outcomes to be achieved;
- Any theoretical training should be supported by practical (on-site) training to ensure that the participant in equally capacitated in terms of the academic knowledge and its application in the field;
- Capacity building has time- and financial boundaries. A time-based, structured plan with specific milestones and indicators need to support the initiatives;
- The impact of the capacity building must be measured according to pre-determined indicators at different stages: i) at start, ii) during and/or iii) after the initiative, and iv) at longer timeframes (annually, biennially, etc.);
- Training manuals, tools and presentations ensure that training is interactive and structured and provides reference if the participant wish to revisit the material. Materials for reading are an important adjunct, but should not be overloaded. Training materials should be brief, accessible, clear and user-friendly;
- Training must allow for as much interaction and learning from other participants as possible. Where possible, participants from different municipalities should participate in learning events to draw benefit from each other's enquiries, thinking and contributions from the workplace;
- Experts (aka *extension advisors* *) should be available to train, demonstrate, guide and support the participants towards achieving the outcomes of the capacity building initiative. The role of the extension advisors is fundamentally different to that of a consultant, i.e. a consultant conduct the work and produce a final product;
- In following a 'learn-and-do' capacity model, municipal officials (participants) need to do the work themselves, guided by the extension advisors;
- The capacity building (support) model should be funded over a longer term, ensure access to experts, and encourage an enabling environment whereby relationships are fostered, role players work inter-dependently and follows a structured workplan with pre-defined targets;
- An ideal capacity building framework work with flexibility, emerging opportunities and adaptability instead of complete overhauling existing processes and systems;
- Relationships should be forged and partnerships developed with stakeholders to co-ordinate capacity building interventions. The link between training and capacity development are critical and should be designed in tandem to achieve the capacity objectives and outcomes;
- Formal training that form part of capacity development initiatives, should be approved through a central body or professional institution, e.g. SALGA, WISA, SETA, etc.

7.5 FRAMEWORK FOR CAPACITY BUILDING IN SOUTH AFRICA

Guided by literature and informed by the WRC pilot study TT 693 and Risk Impact Analysis study, the following framework is proposed to roll-out risk-based capacity building in municipalities across South Africa:

1. Identify municipalities on a risk-based scale of priorities

Risk-based planning is an accepted and familiar practice in municipalities, as it has already been imbedded in terms of disaster management legislation, incentive based regulation and ISO 31000 standards and as part of best practice in water services delivery. Historic and current records of risk scores and relevant risk data is readily available, supported by various tools to calculate and monitor these. Many municipalities use risk-based Blue / Green Drop Implementation Plans (BDIP, GDIP) or Turn-Around Plans, for DWPs and WWTWs to prioritise facilities according to their risk positions (critical, high, medium, low). On this basis, it is possible to develop a matrix or scoping report which outline the risk status of municipal DWPs and WWTWs. With this as baseline, gaps could be identified and support interventions informed.

Output: Risk Identification and Support Intervention for Municipal Water and Wastewater Treatment Plants – a Scoping Report

2. Establish the capacity building baseline and requirements

Based on the above output, the *existing/available capacity* as well as the *required capacity* in the workplace can be determined, by considering information from the risk status of the plants, IRIS and compliance with Regulation 2834 (draft Regulation 813). The analysis will address the technical, management and maintenance needs of a municipality. In addition, capacity constraints on Councillor and inter-departmental support units will be confirmed. The role of the Technical Director, Risk Manager, Municipal Manager, CFO, Councillor, Internal Auditor, etc. within the capacity building initiative need to be considered. Depending on which 'step in the risk ladder' the municipality is likely to occupy, an appropriate capacity building model will be selected from a suite of options. For example:

- a municipality with facilities in crisis positions coupled with staff which have a low knowledge and skill base, will required a specific model which focus on the basics of risk identification and treatment correction;
- a municipality whose profile shows that it resides in moderate risk space but with trends of increased risk, will prompt a triage response whereby quick and appropriate interventions take place to halt the decline and restore the declining capacity and redirect the staff;
- a municipality that have sufficient resources and capacity, and is occupying satisfactory risk positions, and finds itself on the 'performing' or 'mastery' step of the ladder, an appropriate model will take likely take 2 forms:
    - i) to apply advanced risk-based capacity building, which involve aspects such as identification and quantification risks in terms of energy demand, co-generation, process and pumping efficiencies and centralisation and/or commercialisation of biosolids, etc. or
    - ii) to incorporate and develop the expertise of the municipality via a Train-the-Trainer programme to become expansion providers themselves to lesser capacitated municipal teams. This source of capacity is highly viable but totally underdeveloped and untapped in the SA municipal environment.

The output from this exercise will be a detailed *Risk-based Capacity Development Programme*. The programme should consider various aspects such as:

- The risk profile and analysis (data) of municipalities (from the *Scoping Report)*
- Objective of the programme
- Selection of municipalities to be supported
- Key risk areas to be address
- Selection of support model to fit municipal profile
- Stakeholders, roles and responsibilities
- Identification and alignment of existing capacity development and training initiatives
- Enablers and risks to the success of the programme
- Expansion providers
- Programme performance indicators and municipal specific targets (e.g. Target CRR/DBRR, target GD or BD score, % compliance to regulation, # of high risks mitigated, etc.)
- Quality assurance, monitoring, verification and project management
- Responsibilities and timeframes
- Funding mechanisms
- Communication, shared learning in the sector
- Recommendations.

Output: Risk-based Capacity Development Programme

3. Establish partnerships with extension advisors

Extension advisors (commonly referred to as service providers or implementing agents) need to be selected, screened and briefed to coordinate national or regional activities and partner with the municipalities in the programme. The extension advisor need to conform to a strict set of criteria, i.e. established, respected, experienced, with track record and capacitated to perform the task of the advisory entity. Literature shows that municipalities that work with universities yield remarkably good results based on their exposure to applied research and transfer of academic knowledge. NGOs, Water Boards, Professional Institutions, private sector organisations and capacitated municipalities have also been known to be successful implementing agents or extension advisors (Bawkyillenuo, 2015, Mvula Trust, 2015; Water Wheel, 2017). The key principle in terms of such a partnership is that the 'knowledge generator' and the 'knowledge recipient' is optimally aligned and that the risk-based project (irrespective of its scope of work) be used to impart and implement this knowledge.

A number of processes is available to identify, select and appoint extension providers on an extended timeframe within the financial and procurement laws. However, the capability and credibility of the advising individual or group are pivotal to the capacity building programme and the sustainable knowledge transfer in the long terms. This element may very well be the foundation of a national overhaul in the human capital of the municipal water services sector, where a culture and habit of discipline, expertise, caring and efficiency be re-established.

Output: List/Pool of Approved Expansion Advisors with MoAs

4. Conduct a Situation Analysis

The *Risk-based Capacity Development Programme* will form the basis for the development of individual project plans for each municipality that has been selected from the risk-based Scoping Report. A Situation Analysis / Assessment will be done alongside the municipal team to confirm the status of risk planning, water services performance and the staff's capacity in their workplace. In addition, the assessment will identify the challenges, opportunities, intrinsic drivers and local priorities of the municipality, in order to match the most appropriate capacity building model to the particular municipality.

The Situation Analysis report serve to confirm the desktop analysis of the Scoping Report and synthesize a more detailed analysis of the municipality in particular, in order to develop a Risk-based Capacity Building Workstream for the municipality.

The findings and recommendations of the Situation Analysis need to be workshopped with the municipality, and agreement reached on the findings and the scope of work to be done in the next phase.

Output: Situation Analysis Report

5. Development of Detailed Risk-based Capacity Building Workstream

All previous outputs inform the development of a targeted and structured workstream for the municipal water and wastewater services. The workstream will be different for each municipality and will be specific to a particular water or wastewater facility and team. The principles and approach of risk-based capacity building will apply, as outlined under Section 4. The content of- and agreement by the recipients are important, as the officials are likely to already be under-capacitated to meet the workplace demands, and will only engage with the capacity building workstream if it is of direct value the individual and the municipality.

The workstream will consist of (but not limited to):

- Situation analysis
- Purpose of workstream
- Scope of work
    - Technical component of work (e.g. development of a WSP or W_2RAP)
    - Capacity development element associated with technical work
- Methodology*
    - Selection of capacity building model
    - Approach to execute technical component of work
- Selection and monitoring of key indicators
    - Outline indicators to measure capacity building (e.g. % compliance to Reg 813, subject knowledge score, etc.)
    - Outline indicators to measure the technical elements (e.g. # of high risks mitigated, % targeted risks mitigated, %CRR, %BDRR, etc.)
    - Determine the measurement / monitoring frequency
        i. at start of project – to determine the baseline against which progress/digress will be measured
        ii. during project implementation (for longer term projects only) – to verify that the impact remains on its expected course

iii. at project close-out – to determine the impact of capacity building at time of exit of the support by checking if the participant achieved the necessary set of knowledge and skills to fulfil the workplace requirements
iv. at extended timeframes (annually, biennially, etc.) to monitor and quantify the success of the capacity building initiative on a longer term (sustainability) and determine if the participant/s need any follow-up or refresher interventions.

- Development of structured implementation plan / workplan (including activities, timeframe, outputs, responsible persons, measurement indicator)
- Outline stakeholders involved, their roles and responsibilities.

* The methodology applied during WRC pilot project TT 693 (2015) is effective and practical (Figure 35). However, this model can be optimised by incorporating the findings from the risk-based impact study, as seen in Figure 36.

6. Implementation of risk-based capacity building

The development of workstreams or action plans is fairly easy. The implementation is the determining factor whether the capacity building project fails or succeed. The role of the expansion advisor, the relationship with the recipients and the discipline of the collective team are imperative to the short term incremental successes and the longer terms sustainability of the project. 'Walk the road' and 'learn as you go' are accurate descriptions of the capacity building project, whereby technical project become the means to learn and progress in a flexible incremental manner. The role of the expansion advisor is to ensure that the capacity building model be implemented by combining the theoretical (academic) content with the practice (field) situation. The advisor need to communicate knowledge, make new knowledge accessible to the recipients and ensure that the recipients understanding of the theory find its way into practical implementation in the field. Workshops, field visits, and short tests are effective ways to keep focus and momentum. The expansion advisor also has an important role as mediator, to control the quality of the documents or assessments by the recipients, and to make information accessible to decision-makers. Typical outputs from a risk-based capacity building project are (but not limited to):

- WSP and W_2RAPs
- Risk matrix and scoresheet
- Mock Green / Blue Drop assessments
- Process assessments (including sizing and capability of infrastructure)
- Process optimisation
- Water / wastewater monitoring regimes
- BDIP or GDIPs
- Process Controller registration on IRIS and/or WISA
- Development of technical plans, manuals, reports, models, diagrams, etc.
- Tracking of CRR and BDRR
- Correcting process units and water qualities as per interpretation of daily laboratory results
- Others.

Outputs: Any form of technical document, report, database, assessment, diagram, etc. that fit the scope of work

7. Opportunity development

Opportunities will likely emerge during the implementation of a workstream. The approach to the project should be sufficiently flexible to accommodate these. Some examples include:

- 'Systematic opportunism' implies that opportunities be identified that may not necessarily align with political agendas or municipal strategies, but effort may still be invested in a pragmatic manner to explore the opportunity and develop capacity around such prospects (Bawakyillenuo et al., 2015).
- It is advantageous to be constantly supportive of key staff's interests, even if they are not stated top priorities in the workstream. The success of a capacity building initiative reaches beyond the implementation of a structured plan and achievement of set targets. It also revolves around the goodwill of the municipal partner. The principle may be at risk of adding an additional burden onto the already loaded work commitments, and WSIs will only prioritise it if of real benefit to them. The initial building of goodwill will reach far towards building a relationship where priorities may shift over time to realise the maximum impact of the capacity building initiative.
- The role of Champions cannot be over emphasised. These are individuals who are keen to see change and to feel accomplished in their workplace. Risk-based management of water and wastewater services requires a shift in standard work approach, a stretching of fixed job descriptions and some personal effort. Interest feed change, hence, investment in identifying the Champions, and to maintain creativity and responsiveness will yield long term gains.

8. Capacity building through networking and influencing decisions

'Learn by doing' approaches are best complimented by events where lessons around implementation of projects can be shared with peers and partner organisations. The philosophy holds that when one municipality has made progress with implementation, others follow more readily. These events must be specific in design, to allow detailed challenges and solutions to be worked through and the participants can grapple with the issues and problems they face. External experts may contribute or facilitate such events.

The networking function not only facilitates lessons sharing, but also serve to build relationships and nurture knowledge exchange contacts outside of the formal learning environment. This can result in a stronger voice to provincial and national government on key issues of concern to municipalities and influence policy in this regard. For example, leveraging resources (funds, expertise) to support a risk-based turnaround plan at plants which are in crisis state, or for DWS to resuscitate the Blue/Green Drop audits and certification processes. Further examples would typically be to leverage resources to mitigate energy-related risks, i.e. high electricity bills, interrupted supply, energy inefficiencies; or to mitigate the risk of sludge handling problems via infrastructural limitations or operational inefficiencies.

9. Capacity building through shared learning events and formal courses

Formal training courses or master level courses are typically longer period events or courses (one week, three months, 1 year, et al.) which cover specific subject fields. It can be offered by training institutions, by the expansion advisor, or by technical experts who is contracted against a specific need. Ideally, each training event should be supported by a test or examination, certification of attendance, certificate of training and/or Continuous Professional Development (CPD) points and certificates. In this manner, professionalisation is also promoted and the sense of accomplishment by the recipients, on a personal level, is enhanced.

10. Document lessons and learnings for knowledge sharing in broader sector

The effort and investment into capacity building will be incomplete if the lessons are not shared across the sector. Specific stakeholders are mandated to find and document lessons, learnings and successes. Such messages should be positive, pragmatic, inspiring and motivational, and should profile the successes of the organisations as well as the individuals and champions involved in these programmes. A good example of such initiatives is the WIN-SA lessons series.

11. Project close-out

The project close-out consists of a formal hand-over of the project, facilitated by the expansion advisor. The hand-over serves to review the achievements, failures, lessons learnt, personal reflection by team members, as well as gaps for future correction. The initial workstream need to be updated or expanded, if needed, to plan for the next Implementation Phase (1-2 years), with clear understanding that a Sustainability Review and Impact Analysis will take place in future. The presence of a senior or executive manager is vital for two reasons: i) to acknowledge the people and gains to the organisation from the work done to date; and ii) to commit support and resources to furthering of the work.

Output: Project Close-out Minutes and updated Workstream

12. Sustainability Review

Lessons learnt from the risk-impact study shows that municipalities are more likely to maintain momentum and continue implementation and improvement of risk-based management if a follow-up assessment or review of progress is expected. An agreement need to be reached within the project team as to why, when and how the next review will take place, and included as a workstream activity. The emphasis on sustainability and upkeep of the project's longer term goals needs to be agreed and the municipal project champion needs to take the lead in terms of further implementation objectives.

The impact analysis can be done by the expansion advisor, (benefit = familiar with the municipalities dynamics); and/or by an independent analyst (benefit = has an objective outlook and analysis can include the performance of both the municipality and the expansion advisor).

Output: Sustainability Review and Impact Analysis

Framework Flow Diagram

The approach taken during the pilot project in terms of planning and execution of a risk-based capacity project are illustrated in Figure 35. Figure 36 presents an updated version based incorporation of the lessons learnt from the risk-based impact study, whereby a programmatic approach is followed as described under steps 1-12 above.

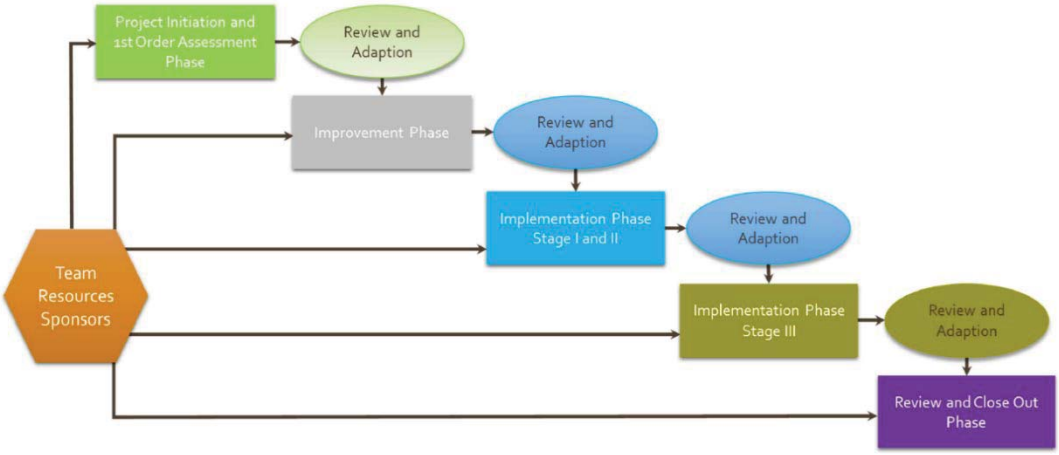


Figure 35: The project flow that was applied during pilot study (WRC Report TT 693, 2015)

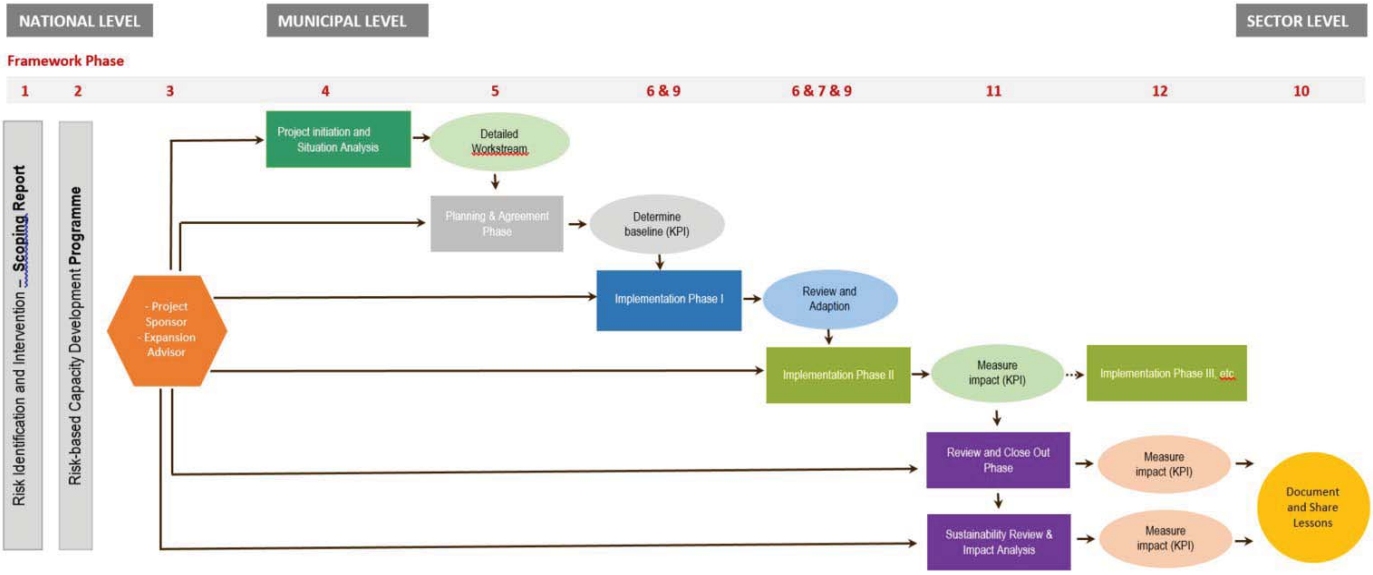


Figure 36: An adapted version of a risk-based initiative, taken from a programmatic viewpoint (Annexure I)

8. RECOMMENDATIONS AND FURTHER WORK

The risk-based impact study consisted of two main elements, namely: i) analysis of the impact of a pilot study on risk-based capacity building at selected district municipalities in the Eastern Cape and KwaZulu-Natal; and ii) the development of a national framework to roll-out risk-based capacity building initiatives to other municipalities in South Africa, by taking advantage of the lessons and learnings.

The risk-impact study concludes that risk-based planning is well understood and adopted at ground level by most municipalities. The majority of municipalities showed that risk management was maintained at some level, with 5 of 7 municipalities showing overall improvement over a four year period. Risk plans are predominantly not integrated into the broader municipal environment and does not influence or inform decision making at executive level. More recent risk drivers, such as electricity cost and demand or sludge handling, are not considered in any of the municipalities (with the exception of the reference DM). A critical factor for successful application of risk management is the involvement of senior management. The study shows that municipalities with involved leaders are generally more motivated, more capacitated and perform better against the set indicators applied during the study. In such cases, managers often require reports against Blue\Green Drop parameters and/or has internalised the Drop system as their own.

The readiness and enthusiasm for new or refresher knowledge by middle managers and technical staff t most of the municipalities are interminably positive and an important lever for future initiatives. The study highlights the importance to measure impact of a support project, the pivotal role of Champions, the negative impact of the waning Blue/Green Drop programme, linked to urgent calls by municipalities to have incentive-based regulation reinstated, and pragmatic recommendations to improve risk-based implementation.

A framework was developed for consideration by national stakeholders towards replication and upscaling of risk-based capacity building across the country. The framework took benefit from numerous cases studies and approaches in the local and global support environment, but was mostly informed by the findings of the capacity building pilot project and by the subsequent impact analysis study. A systematic methodology are proposed for the rollout of risk-based capacity building in South Africa by adopting a developmental and differentiated approach, which allows flexibility whilst demanding structure, through a 'learn-and-do philosophy. The differentiating factors between the approach followed by previous capacity projects and the methodology proposed, are: i) the development of a national risk-based plan which prioritise interventions on a risk basis; ii) the inclusion of measurement points against pre-determined indicators at critical points across the project workstream; iii) the adoption of a follow-up assessment or impact analysis periodically after close-out of a project; and iv) deviating from a 'one-size-fits-all' capacity building model.

The recommendations from the study are as follows:

1. ***Risk-based capacity building***: That the current tools are well developed for entry level risks management, and in no need of major changes. The municipalities related well to them and apply them in their workplace. However, refresher courses need to be held to reinstate and ensure continued uptake of existing tools, guidelines and documents. These include W_2RAP and WSP guidelines, WSP and W_2RAP excel tools, RiskQ, etc.
2. ***Technical capacity building***: Taking que from the variety of documents that the municipalities requested during the interviews, there is a definite need to share and train municipalities on some of the technical materials produced by WRC, WISA, etc. Material related to sludge handling,

oxidation ponds, energy management, sludge classification, inspection of treatment works, etc. are high in demand. Technical knowledge and competency is a key requisite for risk management of water services.

3. ***Development of a risk tracking tool***: The current tools are focussed on entry level risk management, i.e. risk assessment, rating and prioritisation. The current market place require a new tool for advanced risk management to assist in the tracking of risk implementation, (i.e. quantifying risk mitigation, replacing mitigation measures which have proofed ineffective, budget aspects associated with risk reduction, incorporation of targeted risks, etc.). It is important that this tool build on the existing formats and not be developed from scratch. This approach will ensure that it is seen as a continuance and updated version with familiar characteristics and features, but with added functionality.
4. ***Engage the Department of Water and Sanitation***: The results of the study points directly towards the need to have the Blue/Green Drop audits returned to the municipal sector. A high level meeting is required to share the results and facilitate unblocking the reasons for halting of this programme.
5. ***Development of a mock Blue/Green Drop self-assessment tool***: In the absence of the Drop certification programme, the BD/GD tool that was developed to support this study need to be refined and roll-out for use by municipalities. The tool must be provided with training and demonstrations on its use.
6. ***Consultation and implementation of the proposed national framework***: That the framework for replication and upscaling of a risk-based capacity building programme be shared with sector partners to coordinate and plan for future capacity building initiatives.
7. ***Use of risk-based support approach in water resources management:*** The capacity building for risk-based planning may be expanded beyond water services to include water resources, which provides for a risk-based planning framework at catchment level.
8. ***Directed training and capacity building***: Training may be split into three: i) for municipalities, ii) for organisations that advise municipalities on water and on risk management (e.g. MISA; water boards and CMAs) and iii) for auditors (e.g. CIGFARO conference). An introductory course could be online followed by face-to-face support afterwards.
9. ***Data mining***: The study produced a significant amount of data and information which has potential for data mining and input to management information systems that can be used by various information machines to give management diagnostics to municipal managers, i.e. where to focus efforts. Noting, that the Green Drop used to fill this gap in the sector, and is therefore urgently needed back.
10. ***Partnerships***: Partnerships between national and provincial departments, local government, tertiary institutions and private sector are required to roll-out capacity building.

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xvii. WIN-SA, Lesson Series July 2015: Eastern Cape Wastewater Services – From bottom rung on the Green Drop ladder to good performance.

xviii. WIN-SA, Lesson Series July 2015: Factsheet: The Blue Drop – Highlights and Trends from 2009-2014.

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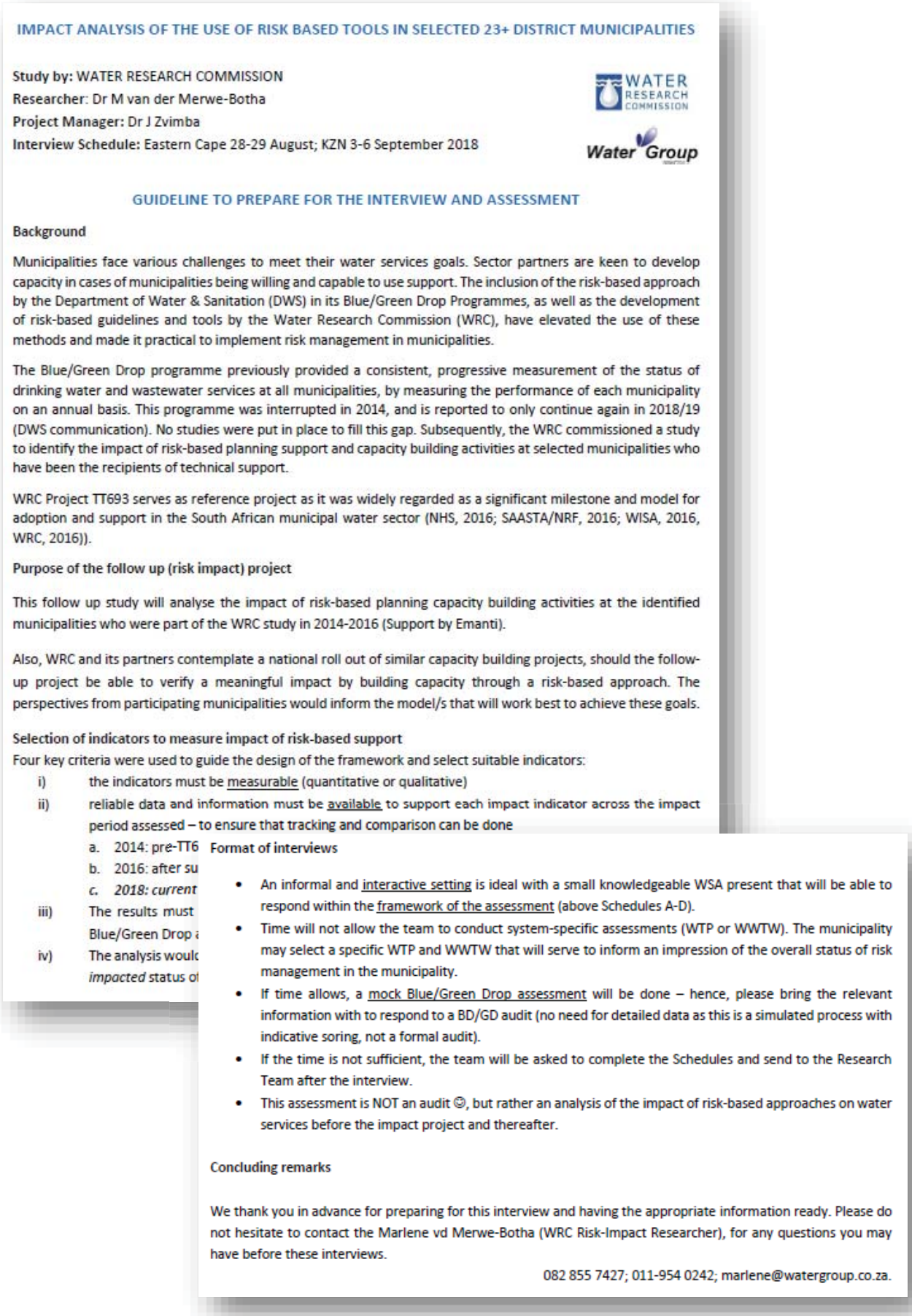
10. ANNEXURE A – GUIDELINE TO DMS TO PREPARE FOR INTERVIEWS



IMPACT ANALYSIS OF THE USE OF RISK BASED TOOLS IN SELECTED 23+ DISTRICT MUNICIPALITIES

Study by: WATER RESEARCH COMMISSION
Researcher: Dr M van der Merwe-Botha
Project Manager: Dr J Zvimba
Interview Schedule: Eastern Cape 28-29 August; KZN 3-6 September 2018

GUIDELINE TO PREPARE FOR THE INTERVIEW AND ASSESSMENT

Background

Municipalities face various challenges to meet their water services goals. Sector partners are keen to develop capacity in cases of municipalities being willing and capable to use support. The inclusion of the risk-based approach by the Department of Water & Sanitation (DWS) in its Blue/Green Drop Programmes, as well as the development of risk-based guidelines and tools by the Water Research Commission (WRC), have elevated the use of these methods and made it practical to implement risk management in municipalities.

The Blue/Green Drop programme previously provided a consistent, progressive measurement of the status of drinking water and wastewater services at all municipalities, by measuring the performance of each municipality on an annual basis. This programme was interrupted in 2014, and is reported to only continue again in 2018/19 (DWS communication). No studies were put in place to fill this gap. Subsequently, the WRC commissioned a study to identify the impact of risk-based planning support and capacity building activities at selected municipalities who have been the recipients of technical support.

WRC Project TT693 serves as reference project as it was widely regarded as a significant milestone and model for adoption and support in the South African municipal water sector (NHS, 2016; SAASTA/NRF, 2016; WISA, 2016, WRC, 2016)).

Purpose of the follow up (risk impact) project

This follow up study will analyse the impact of risk-based planning capacity building activities at the identified municipalities who were part of the WRC study in 2014-2016 (Support by Emanti).

Also, WRC and its partners contemplate a national roll out of similar capacity building projects, should the follow-up project be able to verify a meaningful impact by building capacity through a risk-based approach. The perspectives from participating municipalities would inform the model/s that will work best to achieve these goals.

Selection of indicators to measure impact of risk-based support

Four key criteria were used to guide the design of the framework and select suitable indicators:

i) the indicators must be measurable (quantitative or qualitative)

ii) reliable data and information must be available to support each impact indicator across the impact period assessed – to ensure that tracking and comparison can be done

a. 2014: pre-TT6
b. 2016: after su
c. 2018: current

iii) The results must
Blue/Green Drop a

iv) The analysis would
impacted status of

Format of interviews

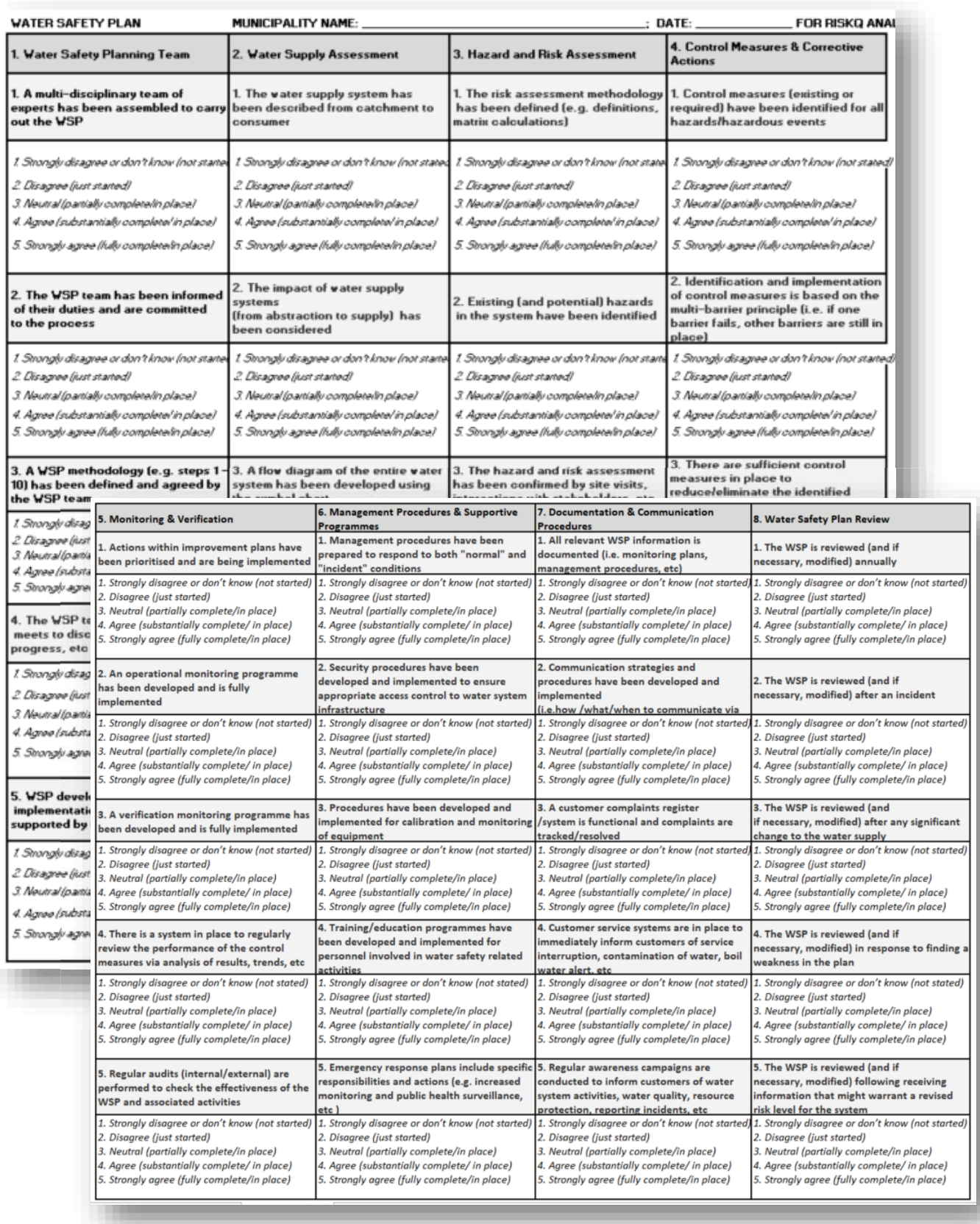
- An informal and interactive setting is ideal with a small knowledgeable WSA present that will be able to respond within the framework of the assessment (above Schedules A-D).
- Time will not allow the team to conduct system-specific assessments (WTP or WWTW). The municipality may select a specific WTP and WWTW that will serve to inform an impression of the overall status of risk management in the municipality.
- If time allows, a mock Blue/Green Drop assessment will be done – hence, please bring the relevant information with to respond to a BD/GD audit (no need for detailed data as this is a simulated process with indicative soring, not a formal audit).
- If the time is not sufficient, the team will be asked to complete the Schedules and send to the Research Team after the interview.
- This assessment is NOT an audit ☺, but rather an analysis of the impact of risk-based approaches on water services before the impact project and thereafter.

Concluding remarks

We thank you in advance for preparing for this interview and having the appropriate information ready. Please do not hesitate to contact the Marlene vd Merwe-Botha (WRC Risk-Impact Researcher), for any questions you may have before these interviews.

082 855 7427; 011-954 0242; marlene@watergroup.co.za.

11. ANNEXURE B – RISKQ VULNERABILITY ANALYSIS

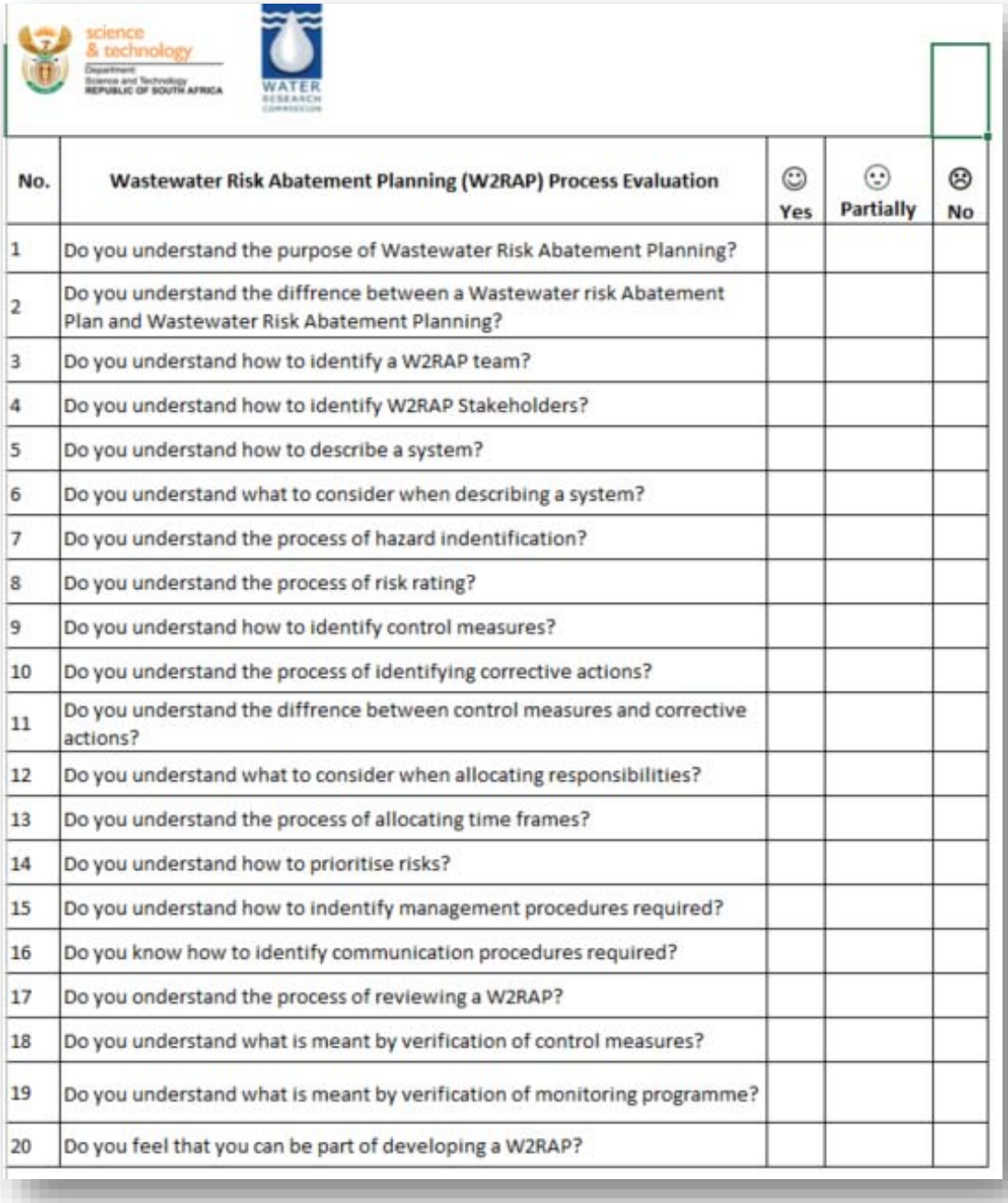


WATER SAFETY PLAN MUNICIPALITY NAME: _____; DATE: _____ FOR RISKQ ANAL

1. Water Safety Planning Team	2. Water Supply Assessment	3. Hazard and Risk Assessment	4. Control Measures & Corrective Actions
1. A multi-disciplinary team of experts has been assembled to carry out the WSP	**1. The water supply system has been described from catchment to consumer**	**1. The risk assessment methodology has been defined (e.g. definitions, matrix calculations)**	**1. Control measures (existing or required) have been identified for all hazards/hazardous events**
1. Strongly disagree or don't know (not started) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*
2. The WSP team has been informed of their duties and are committed to the process	**2. The impact of water supply systems (from abstraction to supply) has been considered**	**2. Existing (and potential) hazards in the system have been identified**	**2. Identification and implementation of control measures is based on the multi-barrier principle (i.e. if one barrier fails, other barriers are still in place)**
1. Strongly disagree or don't know (not started) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*
3. A WSP methodology (e.g. steps 1–10) has been defined and agreed by the WSP team	**3. A flow diagram of the entire water system has been developed using**	**3. The hazard and risk assessment has been confirmed by site visits,**	**3. There are sufficient control measures in place to reduce/eliminate the identified**

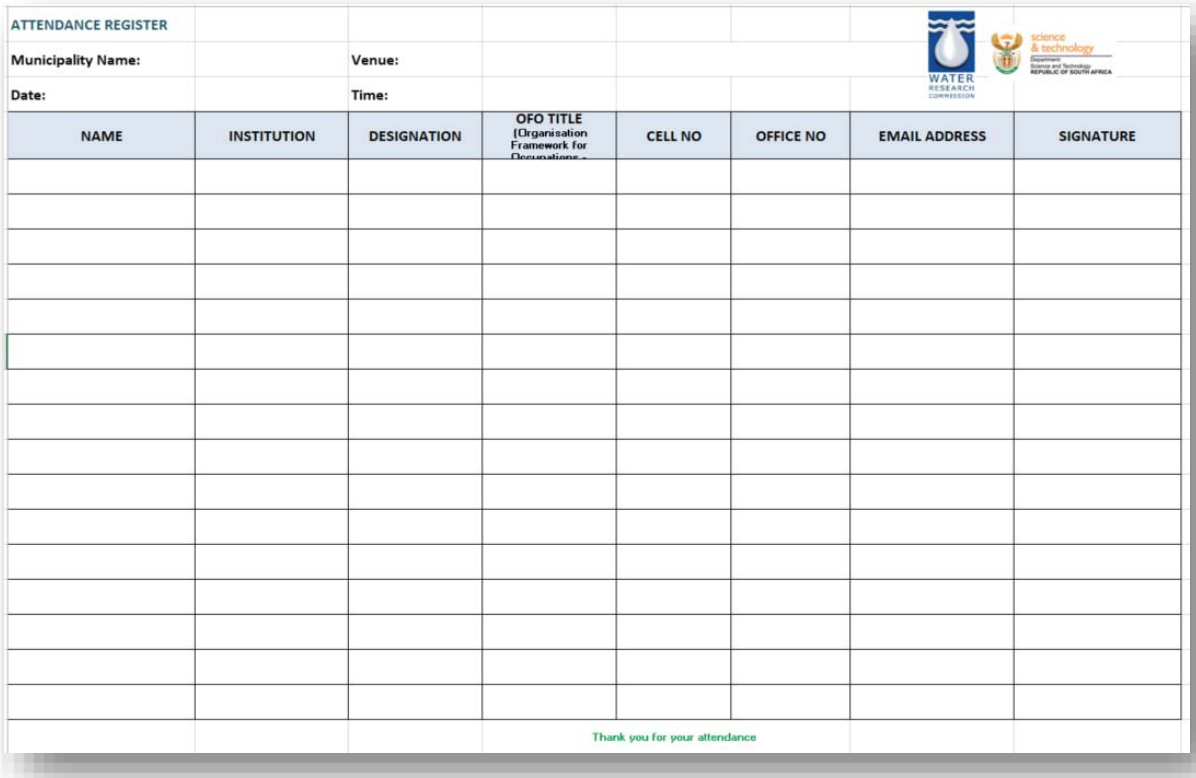
5. Monitoring & Verification	6. Management Procedures & Supportive Programmes	7. Documentation & Communication Procedures	8. Water Safety Plan Review
1. Actions within improvement plans have been prioritised and are being implemented	**1. Management procedures have been prepared to respond to both "normal" and "incident" conditions**	**1. All relevant WSP information is documented (i.e. monitoring plans, management procedures, etc)**	**1. The WSP is reviewed (and if necessary, modified) annually**
1. Strongly disagree or don't know (not started) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*
2. An operational monitoring programme has been developed and is fully implemented	**2. Security procedures have been developed and implemented to ensure appropriate access control to water system infrastructure**	**2. Communication strategies and procedures have been developed and implemented (i.e.how /what/when to communicate via**	**2. The WSP is reviewed (and if necessary, modified) after an incident**
1. Strongly disagree or don't know (not started) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*
3. A verification monitoring programme has been developed and is fully implemented	**3. Procedures have been developed and implemented for calibration and monitoring of equipment**	**3. A customer complaints register /system is functional and complaints are tracked/resolved**	**3. The WSP is reviewed (and if necessary, modified) after any significant change to the water supply**
1. Strongly disagree or don't know (not started) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*
4. There is a system in place to regularly review the performance of the control measures via analysis of results, trends, etc	**4. Training/education programmes have been developed and implemented for personnel involved in water safety related activities**	**4. Customer service systems are in place to immediately inform customers of service interruption, contamination of water, boil water alert, etc**	**4. The WSP is reviewed (and if necessary, modified) in response to finding a weakness in the plan**
1. Strongly disagree or don't know (not stated) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not stated)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not stated)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not stated)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*
5. Regular audits (internal/external) are performed to check the effectiveness of the WSP and associated activities	**5. Emergency response plans include specific responsibilities and actions (e.g. increased monitoring and public health surveillance, etc)**	**5. Regular awareness campaigns are conducted to inform customers of water system activities, water quality, resource protection, reporting incidents, etc**	**5. The WSP is reviewed (and if necessary, modified) following receiving information that might warrant a revised risk level for the system**
1. Strongly disagree or don't know (not started) *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*	*1. Strongly disagree or don't know (not started)* *2. Disagree (just started)* *3. Neutral (partially complete/in place)* *4. Agree (substantially complete/ in place)* *5. Strongly agree (fully complete/in place)*

12. ANNEXURE C – KNOWLEDGE AND SKILLS TRANSFER QUESTIONNAIRE



No.	Wastewater Risk Abatement Planning (W2RAP) Process Evaluation	☺ Yes	😐 Partially	☹ No
1	Do you understand the purpose of Wastewater Risk Abatement Planning?			
2	Do you understand the diffrence between a Wastewater risk Abatement Plan and Wastewater Risk Abatement Planning?			
3	Do you understand how to identify a W2RAP team?			
4	Do you understand how to identify W2RAP Stakeholders?			
5	Do you understand how to describe a system?			
6	Do you understand what to consider when describing a system?			
7	Do you understand the process of hazard indentification?			
8	Do you understand the process of risk rating?			
9	Do you understand how to identify control measures?			
10	Do you understand the process of identifying corrective actions?			
11	Do you understand the diffrence between control measures and corrective actions?			
12	Do you understand what to consider when allocating responsibilities?			
13	Do you understand the process of allocating time frames?			
14	Do you understand how to prioritise risks?			
15	Do you understand how to indentify management procedures required?			
16	Do you know how to identify communication procedures required?			
17	Do you onderstand the process of reviewing a W2RAP?			
18	Do you understand what is meant by verification of control measures?			
19	Do you understand what is meant by verification of monitoring programme?			
20	Do you feel that you can be part of developing a W2RAP?			

13. ANNEXURE D – ATTENDANCE REGISTER TEMPLATE



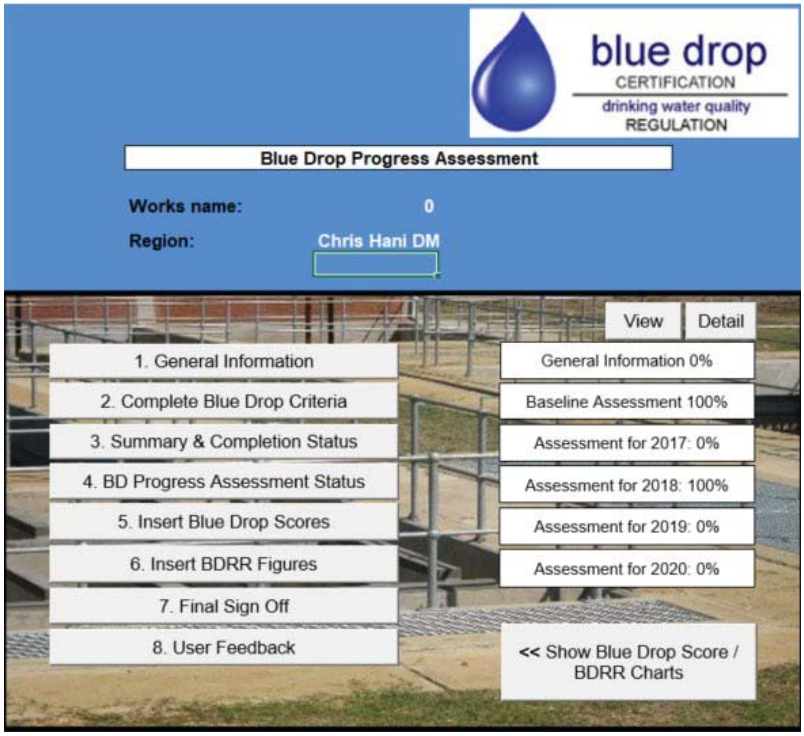
ATTENDANCE REGISTER

Municipality Name: Venue:

Date: Time:

NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations -	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
			Thank you for your attendance				

14. ANNEXURE E – BLUE DROP SELF-ASSESSMENT SCORECARD



Menu

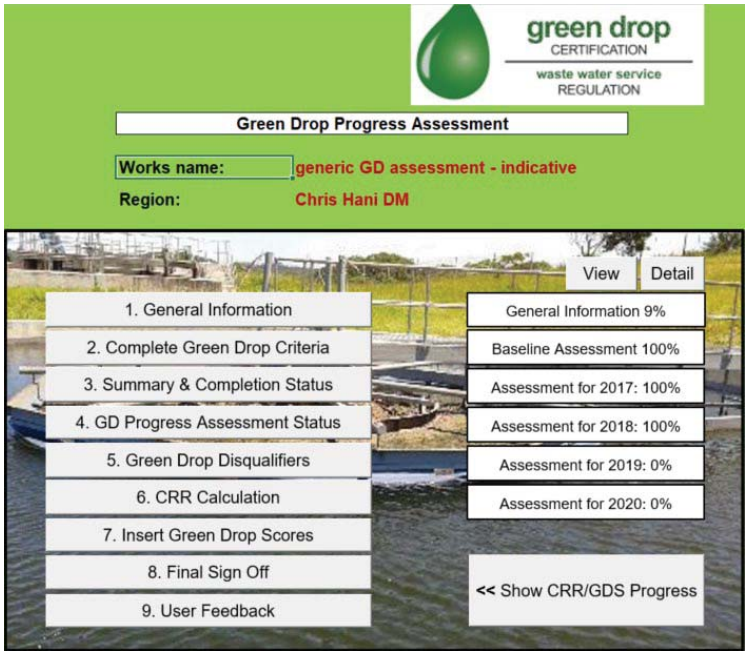
Legend	
Not applicable	100%
Level 0	0%
Level 1	25%
Level 2	50%
Level 3	75%
Level 4	100%

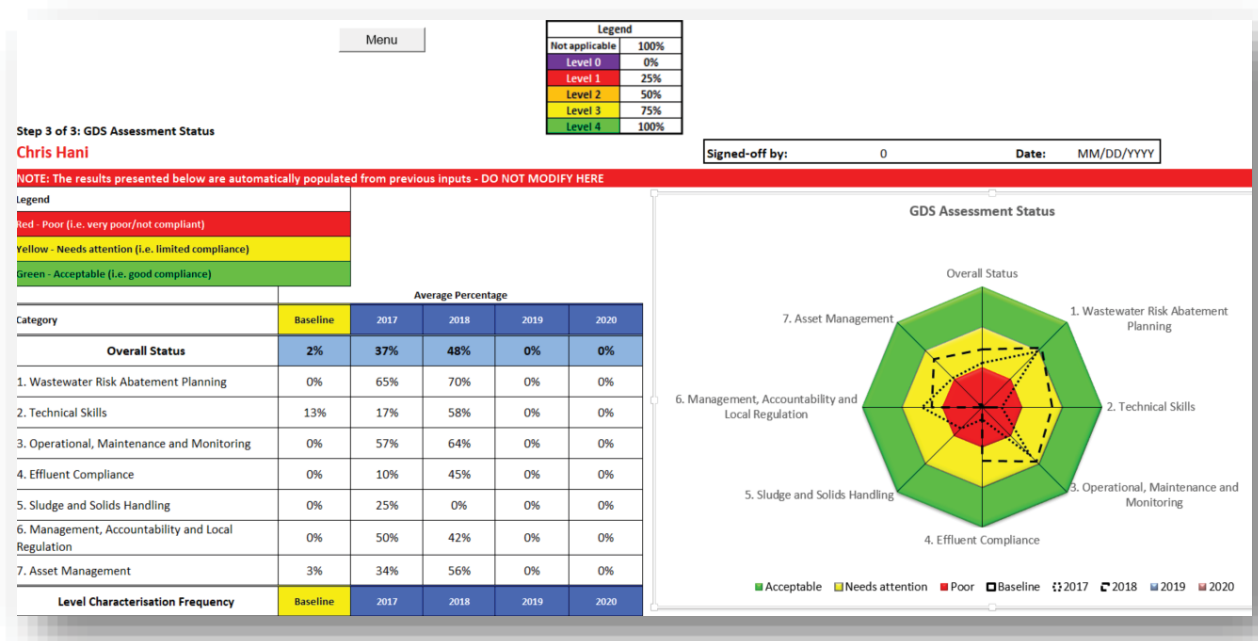
Back

Chris Hani

1. Water Safety Planning		Date Assessed		
1.1 Water Safety Planning Process				2018
Sub-Requirements	**BDS Assessment: Average Level Achieved**	**Level 4**	**Evidence Uploaded to BDS**	
	Scoring Information / Guideline	**Status**		
a) The Water Safety Planning Process is steered by a group of people that includes the technical, financial and management staff of the Water Service Institution (WSI). Where a Water Service Provider arrangement exist, the WSI and Water Service Provider should partake in this process. b) There is clear indication that the WSI conducted a water safety planning process and not only drafted a document. c) There is clear reference to the specific water supply system at hand and not only global risk management measurements put in place.	• Fully complying (Level 4) • Complying only with B & C (Level 3) • Complying only with A & C (Level 2) • Complying only with A & B (Level 2) • Complying only with one of the sub-requirements (Level 1) • No Water Safety Planning process practised (Level 0)	Level 4		
1.2 Risk Assessment				2018
Sub-Requirements	**BDS Assessment: Average Level Achieved**	**Level 3**	**Evidence Uploaded to BDS**	
	Scoring Information / Guideline	**Status**		
a) The Risk Assessment covers catchment, treatment and reticulation.	• Risk assessment covers all 3 components of the supply system (Level 4) • Risk assessment covers collection and treatment (Level 3) • Risk assessment covers only treatment (Level 2) • Risk assessment covers only reticualtion (Level 1) • No risk assessment conducted (Level 0)	Level 4		

15. ANNEXURE F – GREEN DROP SELF-ASSESSMENT SCORECARD





16. ANNEXURE G – DETAILS OF PARTICIPATING MUNICIPALITIES AND INFORMATION SHARED

The following interviews took place with participating municipalities:

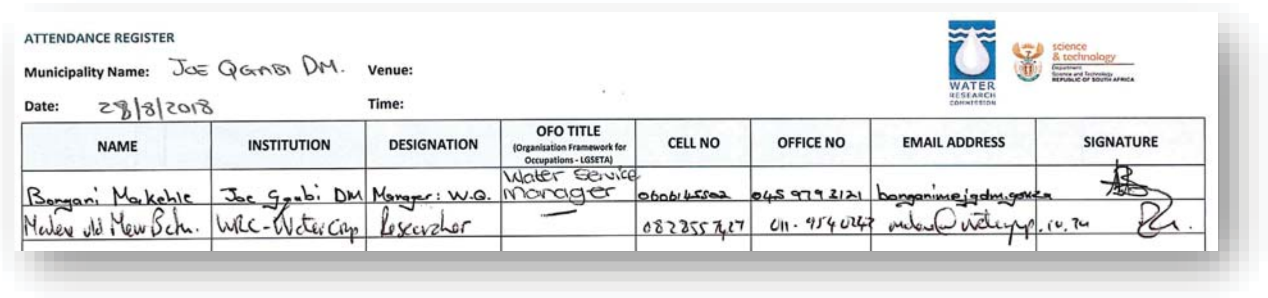
EASTERN CAPE: 28-29 August 2018

Date	Activity	Contact person	Address
Tues, 28 Aug	Joe Gqabi DM, Barkley East	Bongani Makehle, Manager: Water Quality	Cnr Cole & Graham Streets, Barkly East
Wed, 29 Aug	Chris Hani DM, Queenstown	Moses Shasha, Senior manager-WSA; Zendane Kuboni, Senior Technician: Water Management	CHDM Water treatment works Boardroom 42 Milner Street, Top Town, Queenstown
	Amathole DM, East London	Stephen Nash, General Manager; Xolile Gazi, Area Manager: Water Care; Mongezi Mabece	ADM offices, 3-33 Philip Frame Chiselhurst, East London

KWAZULU-NATAL: 3-6 September 2018

Date	Activity	Contact person	Address
Mon, 3 Sept	Zululand DM, Ulundi	Xolani Buthelezi, Water Service Manager	B400, Ugagane Street, Ulundi, KZN
Tues, 4 Sept	Amajuba DM, Madadeni	Luyanda Simelane, Process Technician	B 9356, Section 2, Madadeni
	uMzinyathi DM, Dundee	L H Mthemba, Senior Manager Lunga Khumalo	39 Victoria St, Dundee
Wed, 5 Sept	uThukela DM, Ladysmith	Bheki Khoza, General Manager Cindy Coetzee, Act Director * Lab Manager	Upper Committee room no 2, 36 Lyell Street, Ladysmith.
Thur, 6 Sept	Harry Gwala DM, Ixopo	Nobuhle Pamela Nkabane, Director Water Services	40 Chapel Street, Ixopo

Joe Qgabi DM participating team and knowledge sharing:



ATTENDANCE REGISTER

Municipality Name: Joe Qgabi DM. Venue:

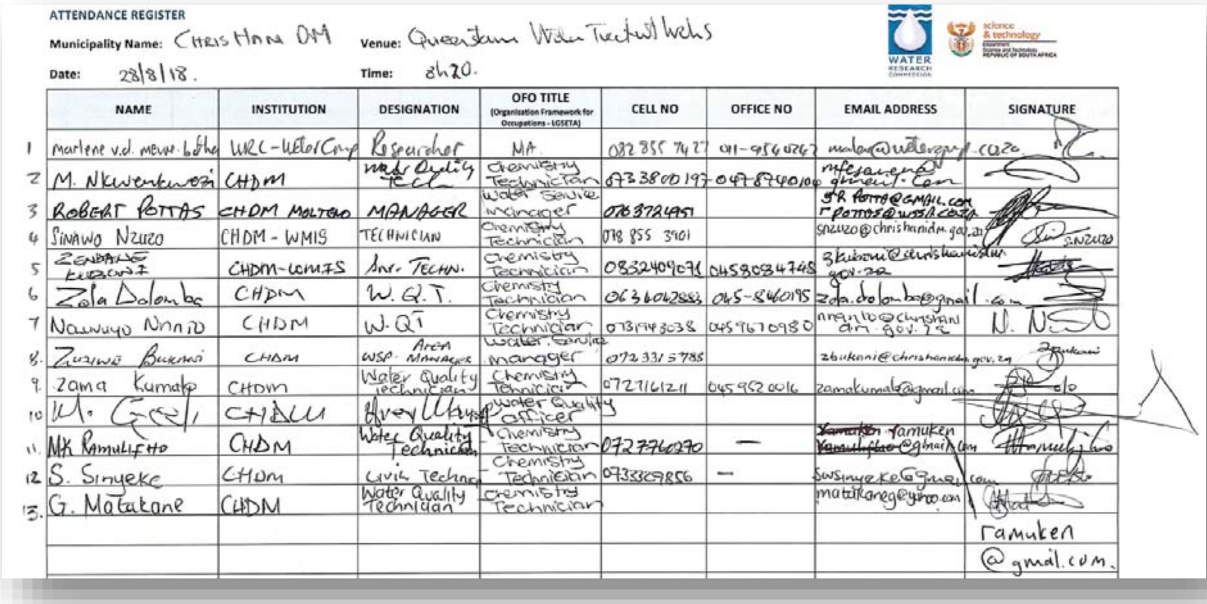
Date: 28/8/2018 Time:

NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
Bongani Makehle	Joe Gqabi DM	Manager: W.Q.	Water Service Manager	0606145502	045 979 2121	banganime@jgdm.gov.za	[signature]
[illegible]	WRC-WaterCorp	Researcher		0828557427	011-9540247	[illegible]	[signature]

On request by the DM team, the following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard;
- ✓ WRC Guidelines on Sludge Management (5 volumes);
- ✓ WSP and W_2RAP WRC assessment tools;
- ✓ Summary of findings of the Risk Analysis.

Chris Hani DM participating team and knowledge sharing:



ATTENDANCE REGISTER

Municipality Name: Chris Hani DM Venue: Queenstown Water Treatment Works

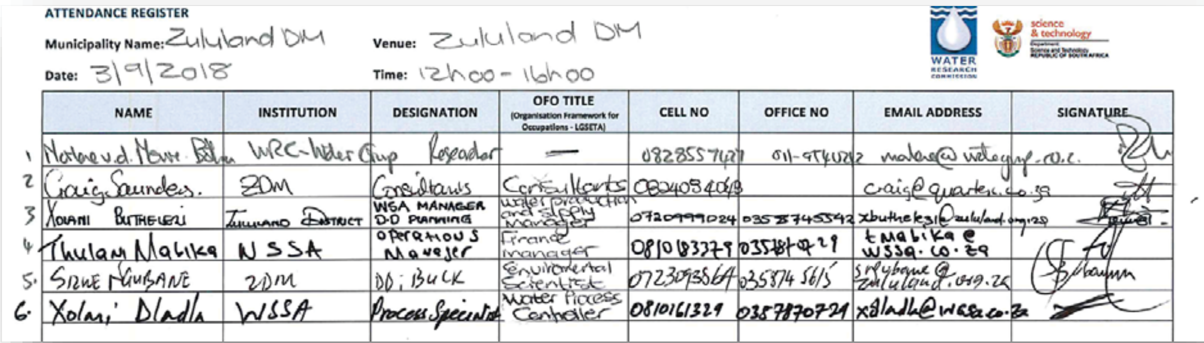
Date: 28/8/18. Time: 8h20.

	NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
1	Marlene v.d. Merwe-Botha	WRC-Water Group	Researcher	MA	082 855 7427	011-9564267	marlene@watergroup.co.za	
2	M. Nkwenkwezi	CHDM	Water Quality Tech	Chemistry Technician	0733800197	047 8740106	mfesane@gmail.com	
3	Robert Pottas	CHDM Molteno	Manager	Water Service Manager	0763724951		SR Potts@gmail.com rpottas@wssa.co.za	
4	Sinawo Nzuzo	CHDM - WMIS	Technician	Chemistry Technician	078 855 3901		snzuzo@chrishanidm.gov.za	
5	Zendaye Kubom?	CHDM-WMIS	Snr. Techn.	Chemistry Technician	0832409071	0458084748	zkuboni@chrishanidm.gov.za	
6	Zola Dolomba	CHDM	W.Q.T.	Chemistry Technician	0636042883	045-8460195	zola.dolomba@gmail.com	
7	Nawuyo Nnnio	CHDM	W.QT	Chemistry Technician	0731943038	0459670980	nnanio@chrishanidm.gov.za	
8.	Zuziwe Bukani	CHDM	WSP Area Manager	Water Service manager	072 331 5785		zbukani@chrishanidm.gov.za	
9.	Zama Kumalo	CHDM	Water Quality Technician	Chemistry Technician	0727161211	045 952 0016	zamakumalo@gmail.com	
10	M. Gceli	CHDM	[illegible]	Water Quality officer				
11.	MK Ramulifho	CHDM	Water Quality Technician	Chemistry Technician	0727760270	—	ramuken@gmail.com	
12	S. Sinyeke	CHDM	Civil Technician	Chemistry Technician	0733329856	—	swsinyeke@gmail.com	
13.	G. Matakane	CHDM	Water Quality Technician	Chemistry Technician			matakaneg@yahoo.com	
								ramuken
								@gmail.com.

On request by the DM team, the following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard
- ✓ WRC TT 693 individual reports (8 reports)
- ✓ RiskQ tool (link provided)
- ✓ WRC Guidelines on Sludge Management (5 volumes)
- ✓ WRC oxidation ponds guidelines (3 volumes)
- ✓ WSP and W_2RAP WRC assessment tools
- ✓ Summary of findings of the Risk Analysis.

Zululand DM participating team and knowledge sharing:



ATTENDANCE REGISTER

Municipality Name: Zululand DM Venue: Zululand DM

Date: 3/9/2018 Time: 12h00 - 16h00

	NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
1	Marlene v.d. Merwe-Botha	WRC-Water Group	Researcher	—	0828557427	011-9564262	marlene@watergroup.co.za	
2	Craig Saunders.	ZDM	Consultants	Consultants	0824084049		craig@quarters.co.za	
3	Xolani Buthelezi	Zululand District	WSA Manager D.D Planning	Water production and supply Manager	0720999024	0358745542	xbuthelezi@zululand.org.za	
4	Thulani Mabika	NSSA	Operations Manager	Finance manager	0810183379	0358748429	tmabika@wssa.co.za	
5.	Sizwe Ngubane	ZDM	DD; Bulk	Environmental Scientist	0723093864	035874 5615	sngubane@zululand.org.za	
6.	Xolani Dladla	WSSA	Process Specialist	Water Process Controller	0810161329	0358780724	xdladla@wssa.co.za	

The following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard;
- ✓ Summary of findings of the Risk Analysis.

Amajuba DM participating team and knowledge sharing:

ATTENDANCE REGISTER

Municipality Name: AmajubaDM | Venue: Amajuba DM Boardroom

Date: 4/9/2018 | Time: 8h00 – 11h30.

	NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
1	Marlene v.d. Merwe Botha	WRC-Watergroup	Researcher	–	082 855 7427	011-9540262	marlene@watergroup.co.za	
2	Luyanda Simelane	Amajuba DM	Process Tec	Chemistry Technician	074 8683422	034329 7215	luyandas@amajuba.gov.za	
3	Lungile Thwala	Amajuba DM	Superintendent Water Treatment Plant	No Title Water & Waste	0780918807	034 3297237	lungilet@amajuba.gov.za	
4	Mhlengeni Jiyane	Amajuba DM	Assistant Director	Assistant research & development manager Water & Sanitation	0724526784	0343297236	[illegible]	
5	Siphamandla Mabizela	Amajuba DM	A D TES	Assistant research and development manager	0832316448	0343297235	Siphamandla [illegible]	
6	Jackson Maepa	Amajuba DM	Sen Proc Cont	Water Process Controller Water and Waste	0761637715		jacksonm@amajuba.gov.za	
7	Nocwazi Shabalala	Amajuba DM	Technician	Chemistry Technician	0767349649	0343297237	nocwazi@amajuba.gov.za	
8	Sabelo Dube	Amajuba DM	CP Technician	Chemistry Technician	079 169 0482	7237	sabelod@amajuba.gov.za	

On request by the DM team, the following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard
- ✓ WRC Guidelines on Sludge Management (5 volumes)
- ✓ WRC Guidelines on maintenance of pond systems (3 volumes)
- ✓ Example of a Sludge Management Plan and mass balance tool
- ✓ Summary of findings of the Risk Analysis.

uThukela DM participating team and knowledge sharing:

ATTENDANCE REGISTER

Municipality Name: Uthukela DM | Venue: Cantee Room 2

Date: 5/9/2018 | Time: 8h15.

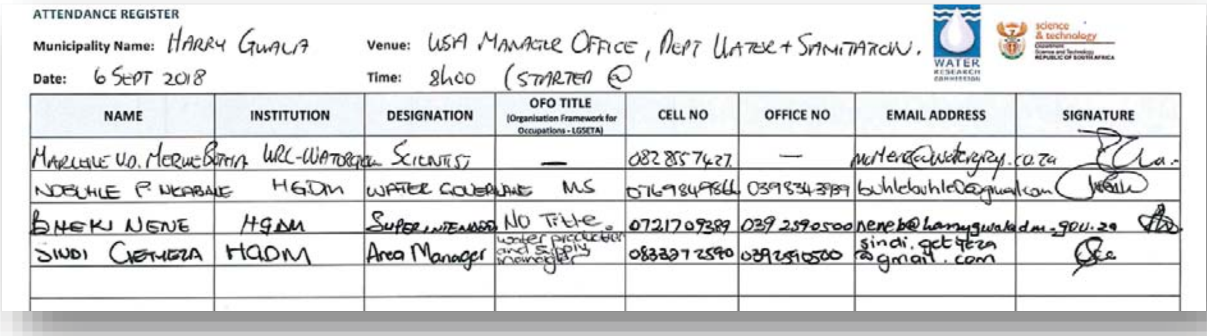
NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
Marlene v.d. Merwe Botha	WRC-WaterGroup	Researcher	–	082855 7427	011-9540262	marlene@watergroup.co.za	
Cindy Coetzee	WSA - UDM	Acting Manager WSA	Acting water Service Manager	082 904 6115		CCoetzee@uthukela.gov.za	
Francois Klaasen	WSA - UDM	BDS [illegible] Officer	Compliance Officer	0769177631		FClaassen@uthukela.gov.za	
Gugu Mbense	MHS UTDM	Acting Manager MHS	Acting water service Manager	072 564 8065	Fi-011.	gubense@uthukela.gov.za.	
Sindi Shabalala	WSA - UDM	Lab technician/ GDS4BDS Regulator	Geophysical Technician	–	(036)6385100	SShabalala2@uthukela.gov.za	
Sifiso Shabalala	WSA – UTDM	GDS Comp Off	Compliance officer	0829017324	"	SShabalala@uthukela.gov.za	
P I Khumalo	WSA – UTDM	BDS Comp. Off.	Compliance officer	0795109081	"	PKhumalo@uthukela.gov.za	
S. Zama	WSA – UTDM	GAS Comp. Off.	Compliance officer	0764803323		SZama2@uthukela.gov.za	
Z. L. Nxumalo	WSA - UTDM	Acting Manager Laboratory	Laboratory Acting Manager	071 139 9051	036 638 5100	znxumalo@uthukela.gov.za	
N. Ndlovu	WSA – UTDM	LAB. TECH.	Geophysical Technician	–	036 6385100	–	
A. Osman	Risk MNG - UTDM	Risk officer	Organisational Risk Manager	0817517763	0386365[illegible]	aosman@uthukela.gov.za	

On request by the DM team, the following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard
- ✓ No Drop Report for uThukela DM
- ✓ New GD criteria – DWS 10 year plan from WISA 2014
- ✓ Index for Sludge Management Plan
- ✓ Index for an O&M manual to assist in TOR development
- ✓ WRC Guidelines on Sludge Management (5 volumes)

- ✓ Input on gaps of WSP and W_2RAPs
- ✓ Summary of findings of the Risk Analysis.

Harry Gwala DM participating team and knowledge sharing:



ATTENDANCE REGISTER

Municipality Name: HARRY GWALA Venue: WSA MANAGER OFFICE, DEPT WATER + SANITATION.

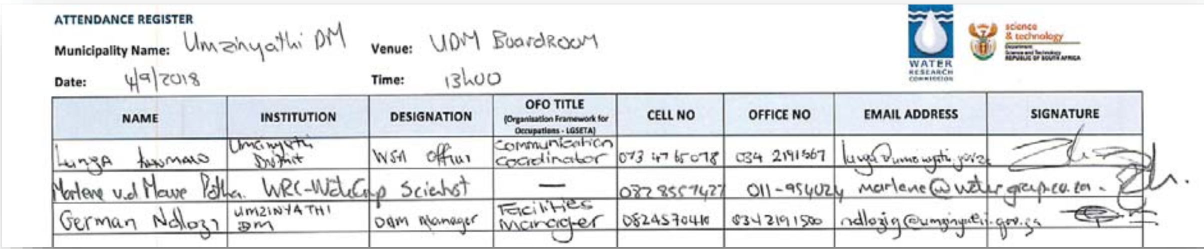
Date: 6 SEPT 2018 Time: 8h00 (STARTED @

NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
MARLENE V.D. MERWE-BOTHA	WRC-WATERGROUP	SCIENTIST	—	082 855 7427	—	marlene@watergroup.co.za	[illegible]
NDBUHLE P NKABANE	HGDM	WATER GOVERNANCE	MS	0769849864	0398343989	[illegible]	[illegible]
BHEKI NENE	HGDM	SUPERINTENDENT	NO TITLE.	0721709389	039 2590500	neneb@harrygwaladm.gov.za	[illegible]
SINDI CETYEZA	HGDM	Area Manager	water production and supply manager	0833272590	0392590500	sindi.cetyeza@gmail.com	[illegible]

On request by the DM team, the following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard
- ✓ WRC Guidelines on Sludge Management (5 volumes)
- ✓ WRC Guidelines on management of oxidation ponds (3 volumes)
- ✓ WRC report on municipal tariffs (S Slabbert)
- ✓ Mass balance calculation for Sludge Management Planning
- ✓ Summary of findings of the Risk Analysis.

uMzinyathi DM participating team and knowledge sharing:



ATTENDANCE REGISTER

Municipality Name: Umzinyathi DM Venue: UDM BoardRoom

Date: 4/9/2018 Time: 13h00

NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
Lunga [illegible]	Umzinyathi District	WSA Officer	Communication Coordinator	073 47 65 078	034 2191567	[illegible]@umzinyathi.gov.za	[illegible]
Marlene v.d Merwe Botha	WRC-WaterGroup	Scientist	—	082 855 7427	011-9540214	marlene@watergroup.co.za	[illegible]
German Ndlozi	UMZINYATHI DM	O&M Manager	Facilities Manager	0824570410	0342191500	ndlozig@umzinyathi.gov.za	[illegible]

On request by the DM team, the following information was shared in addressing some knowledge gaps identified during the interview session:

- ✓ Indicative BD and GD scorecard;
- ✓ Summary of findings of the Risk Analysis.

Amathole DM participating team and knowledge sharing:

ATTENDANCE REGISTER

Municipality Name: AMATHOLE DM Venue: ADM office

Date: 29 AUG 2018 Time: 14h30.

NAME	INSTITUTION	DESIGNATION	OFO TITLE (Organisation Framework for Occupations - LGSETA)	CELL NO	OFFICE NO	EMAIL ADDRESS	SIGNATURE
Stephen Nash	ADM	GM WSP	research and development Manager	0824190871	043 7035514	stephenn@amathole.gov.za	[illegible]
Lester van Rooyen	ADM.	Ass Manager	Assistent Water Service Manager	082414 0377.		lester@amathole.gov.za	[illegible]
[illegible] S	ADM	SM — WSP	Research and Development Manager	043 7035 [illegible]	—	[illegible]	[illegible]
Siya Mneno	ADM	Ass Manager	Assistent Water Service Manager	0734329958	0437832664	siyam@amathole.gov.za	[illegible]
Bongeka Mvuzo	ADM	Ass- Manager	Assistent Water Service Manager	082 8613015	0437832630	bongekam@amathole.gov.za	[illegible]
Xolile Gazi	ADM	Ass. MANAGER	Assistent Water Service Manager	0635831799	043 783 248	xolileg@amathole.gov.za	[illegible]
Mongezi Mabece	ADM	Manager Water	Water Service Manager	0799537437	0437035857	mongezim@amathole.gov.za	[illegible]
Marlene van der Merwe [illegible]	WRC. Wetcups	Researcher	—	082 855 7427	011-9540742	marlene@wetcups.co.za	[illegible]

On request by the DM team, the following information was shared:

- ✓ Facilitation of introduction to ERWAT's Manager who spearhead the implementation of an internal Blue / Green Drop programme for further sharing of lessons and experiences.

17. ANNEXURE H – OFO FRAMEWORK FOR PROPOSED POSITION TO BE INVOLVED IN RISK MANAGEMENT OF WATER SERVICES

Job Title	OFO Code	OFO Title
Abstraction & Water Treatment Works	2017-213306	Water Quality Analyst
Air Quality Manager	2017-134901	Environmental Manager
Alternative Energy Manager	2017-132105	Power Generation Operations Manager
Artisan	*	*
Artisan Assistant (Water / Wastewater Related)	2017-831302	Drainage, Sewerage and Storm Water Worke
Artisan Foreman	*	*
Asset Maintenance Manager	2017-143901	Facilities Manager
Asset Manager	2017-121903	Physical Asset Manager
Catchment Management Manager	2017-121910	Water Asset Manager
CFO	2017-121101	Finance Manager
Chief Buyer	2017-132401	Supply and Distribution Manager
Chief Civil Engineering Technologist*	2017-311201	Civil Engineering Technician
Chief Environmental Health Practitioner	2017-226301	Environmental Health Officer
Chief Finance Officer	2017-121101	Finance Manager
City Manager	2017-111203	Local Authority Manager
Civil Operations and Maintenance Manager	2017-132104	Engineering Manager
Climate Change Mitigation Manager	2017-134901	Environmental Manager
Communications Manager	2017-122201	Advertising and Public Relations Manager
Compliance Monitoring Manager	2017-134904	Office Manager
Conservation Officer	2017-213301	Conservation Scientist
Contact Centre Manager	2017-143905	Call or Contact Centre Manager
Contracts Manager	2017-121904	Contract Manager
Councillor	2017-111101	Local or Provincial Government Legislator
Customer Care / Services Manager	2017-122105	Customer Service Manager
Customer Relations Manager	2017-122105	Customer Service Manager
Deputy Director *	*	*
Disaster Management Manager	2017-134912	Commissioned Fire and Rescue Officer
Electrical Services Manager	2017-134904	Office Manager
Energy Efficiency Manager	2017-134901	Environmental Manager
Enforcement & Prosecution Manager	2017-134919	Traffic and Law Enforcement Manager
Engineer (Chemical)	2017-214501	Chemical Engineer
Engineer (Civil)	2017-214201	Civil Engineer
Engineer (Electronics)	2017-215201	Electronics Engineer
Engineer (Mechanical)	2017-214401	Mechanical Engineer
Engineering Services Manager	2017-132104	Engineering Manager
Engineering Technologist (Water and Sanitation)	2017-214202	Civil Engineering Technologist
Environmental Impact Assessment Specialist	2017-214302	Environmental Impact and Restoration Analyst
Environmental Protection Officer	2017-213301	Conservation Scientist
Environmental Scientist/ Technician	2017-213302	Environmental Scientist
Expenditure Accountant	2017-241107	Financial Accountant
Expenditure Manager	2017-121101	Finance Manager
Expenditure Officer	2017-431101	Accounts Clerk
Financial Planning	2017-241102	Management Accountant
Financial Planning Manager	2017-121101	Finance Manager
Financial Services Manager	2017-121101	Finance Manager
General Worker*	2017-862202	Handyperson
Graduate *	*	*
Health & Safety Officer (Occupational)	2017-226302	Safety, Health, Environment and Quality (SHE
Human Resource Development Manager	2017-121202	Business Training Manager
Human Resources Manager	2017-121201	Human Resource Manager
Hydrological Technician	2017-213306	Water Quality Analyst
IDP Manager	2017-121301	Policy and Planning Manager
Infrastructure Manager	2017-134904	Office Manager
Infrastructure Planning and Development Manager	2017-121301	Policy and Planning Manager
In-Service Training	2017-900000	Learner
Inspector (Pollution Chasing)	2017-335906	Environmental Practices Inspector
Inspector: Waste Reclamation	2017-335906	Environmental Practices Inspector
Institutional Capacity Building & Support Manager	2017-121202	Business Training Manager
Instrument Technician	2017-311301	Electrical Engineering Technician
Integrated Development Plan (IDP) Officer	2017-334102	Office Administrator
Knowledge Management Officer	2017-262202	Information Services Manager
Lab Technician (Environmental)	2017-311704	Geophysical Technician
Laboratory Analysts	2017-311101	Chemistry Technician
Laboratory Attendant	2017-311101	Chemistry Technician
Laboratory Manager	2017-134902	Laboratory Manager
Labourer: Sewer	2017-831302	Drainage, Sewerage and Storm Water Worker
Legal Administration Manager	2017-121902	Corporate Services Manager
Maintenance Manager	2017-143901	Facilities Manager
Mechanical Services and Store Manager	2017-134904	Office Manager
Mechanical Workshop Manager	2017-132104	Engineering Manager
Media and Liaison Officer	2017-243201	Communication Coordinator
Millwright	2017-671202	Millwright
Monitoring & Evaluation Manager	2017-122301	Research and Development Manager
Monitoring and Evaluation Officer	2017-242202	Policy Analyst
Municipal Councillor	2017-111101	Local or Provincial Government Legislator
Municipal Health Services Manager	2017-134204	Secondary Health Services Manager
Municipal Manager	2017-111203	Local Authority Manager
Municipal Services Managers	2017-122301	Research and Development Manager
Natural Resources Manager	2017-134901	Environmental Manager
Occupational Safety and Health Manager	2017-121206	Health and Safety Manager
On Site Sanitation Manager	2017-134901	Environmental Manager
Operating Budget Manager	2017-121101	Finance Manager
PA (any office)	2017-334302	Personal Assistant
Performance and Risk Officer	2017-242208	Organisational Risk Manager
Performance Management Specialist / Coordinator	2017-242102	Organisation and Methods Analyst
Performance Management System*	*	*
Personal Assistant	2017-334302	Personal Assistant
Plant Operator	2017-313201	Water Plant Operator
Plumber	2017-642601	Plumber
Plumber Assistant	2017-831304	Plumber's Assistant
PMU Manager	2017-121905	Programme or Project Manager
Pollution and Environmental Technician	2017-314102	Environmental Science Technician
Pollution Control Officer	2017-213305	Air Pollution Analyst
Process Controller / Process Control Supervisor	2017-313203	Water Process Controller
Process Operator	2017-313203	Water Process Controller

Procurement Manager	2017-132401	Supply and Distribution Manager
Procurement Officer	2017-332302	Purchasing Officer
Productivity Manager	2017-121201	Human Resource Manager
Project Executive (all projects)	2017-121905	Programme or Project Manager
Project Liaison Officer	2017-243201	Communication Coordinator
Project Management Specialist	2017-242101	Management Consultant
Project Management Unit Manager / Director	2017-121905	Programme or Project Manager
Project Manager	2017-242101	Management Consultant
Purification Official	2017-213306	Water Quality Analyst
QMS Practitioner	2017-121908	Quality Systems Manager
Quality Assurance Manager	2017-121908	Quality Systems Manager
Quality Assurance Officer / Specialist	2017-121908	Quality Systems Manager
Quality Control Officer	2017-121908	Quality Systems Manager
R&S Technical Training Officer	2017-242401	Training and Development Professional
Rapid Response Manager	2017-134904	Office Manager
Regional Manager	2017-134904	Office Manager
Research & Development Manager	2017-122301	Research and Development Manager
Risk and Compliance Officer	2017-242208	Organisational Risk Manager
Risk Control Specialist	2017-242208	Organisational Risk Manager
Road Stormwater Manager	2017-121910	Water Asset Manager
Safety & Risk Manager	2017-121206	Health and Safety Manager
Safety Engineer	2017-214101	Industrial Engineer
Safety Officer	2017-226302	Safety, Health, Environment and Quality (SHE&
Sampler / Sampling Officer	2017-831313	Water Process Worker
Sanitation Planning Manager	2017-134901	Environmental Manager
SCADA Technician	2017-672105	Instrument Mechanician
Scientific Service Technician	2017-314102	Environmental Science Technician
Scientific Services Manager	2017-134901	Environmental Manager
SCM Manager	2017-132401	Supply and Distribution Manager
Sewer Inspector	2017-642605	Plumbing Inspector
Sewer Pumpstation Assistant	2017-831302	Drainage, Sewerage and Storm Water Worker
Skills Development & Informal Training Officer	2017-242401	Training and Development Professional
Skills Development Facilitator (SDF)	2017-242302	Skills Development Practitioner
Skills Development Officer	2017-242401	Training and Development Professional
Stormwater Design Manager	2017-214201	Civil Engineer
Superintendent *	*	*
Supervisor *	*	*
Supply Chain Manager	2017-132401	Supply and Distribution Manager
Sustainability Manager	2017-121909	Sustainability Manager
Systems Performance Technician	2017-215102	Electrical Engineering Technologist
Technical Customer Services Manager	2017-122105	Customer Service Manager
Technical Projects Manager / Director	2017-121905	Programme or Project Manager
Technical Services Manager	2017-132104	Engineering Manager
Technical Trainer Officer (Specialisation)	2017-242402	Occupational Instructor
Technical Training Manager	2017-121202	Business Training Manager

Technician	2017-311101	Chemistry Technician
Technologist (Chemical)	2017-214502	Chemical Engineering Technologist
Technologist (Civil)	2017-214202	Civil Engineering Technologist
Technologist (Electrical / Electronic)	2017-215202	Electronics Engineering Technologist
Telecommunications Manager	2017-122201	Advertising and Public Relations Manager
Telemetry Monitoring Controllers	2017-313203	Water Process Controller
Waste Disposal Site Supervisor	2017-134901	Environmental Manager
Waste Management Inspector	2017-335906	Environmental Practices Inspector
Waste Management Officer	2017-213302	Environmental Scientist
Waste Water Treatment	2017-313201	Water Plant Operator
Wastewater Artisan	2017-642601	Plumber
Wastewater Process Controller	2017-313203	Water Process Controller
Wastewater Works Operator	2017-313201	Water Plant Operator
Water & Sanitation Quality Monitoring Specialist	2017-213306	Water Quality Analyst
Water & Sanitation Sales Analyst	2017-243102	Market Research Analyst
Water & Wastewater Operator	2017-313201	Water Plant Operator
Water (Water Quality) Inspector	2017-213306	Water Quality Analyst
Water Cart Driver	2017-733204	Tanker Driver
Water Compliance Officer	2017-242207	Compliance Officer
Water Conservation Officers	2017-213301	Conservation Scientist
Water Plant Operator	2017-313201	Water Plant Operator
Water Procurement Manager	2017-134901	Environmental Manager
Water Purification / Sewerage Attendant	2017-313201	Water Plant Operator
Water Purification Manager	2017-134901	Environmental Manager
Water Purifier	2017-213306	Water Quality Analyst
Water Quality Officer	2017-213306	Water Quality Analyst
Water Quality Scientist	2017-213306	Water Quality Analyst
Water Restrictions Manager	2017-134901	Environmental Manager
Water Reticulation Artisan	2017-642601	Plumber
Water Sampler	2017-831313	Water Process Worker
Water Services Compliance Manager	2017-134918	Water production and Supply Manager
Water Services Manager	2017-134918	Water production and Supply Manager
Water Tanker Driver	2017-733204	Tanker Driver
Water Works Operator	2017-313201	Water Plant Operator
Workshop Manager	2017-132104	Engineering Manager

18. ANNEXURE I – PROPOSED FRAMEWORK FOR NATIONAL ROLL-OUT OF RISK-BASED CAPACITY BUILDING INITIATIVE