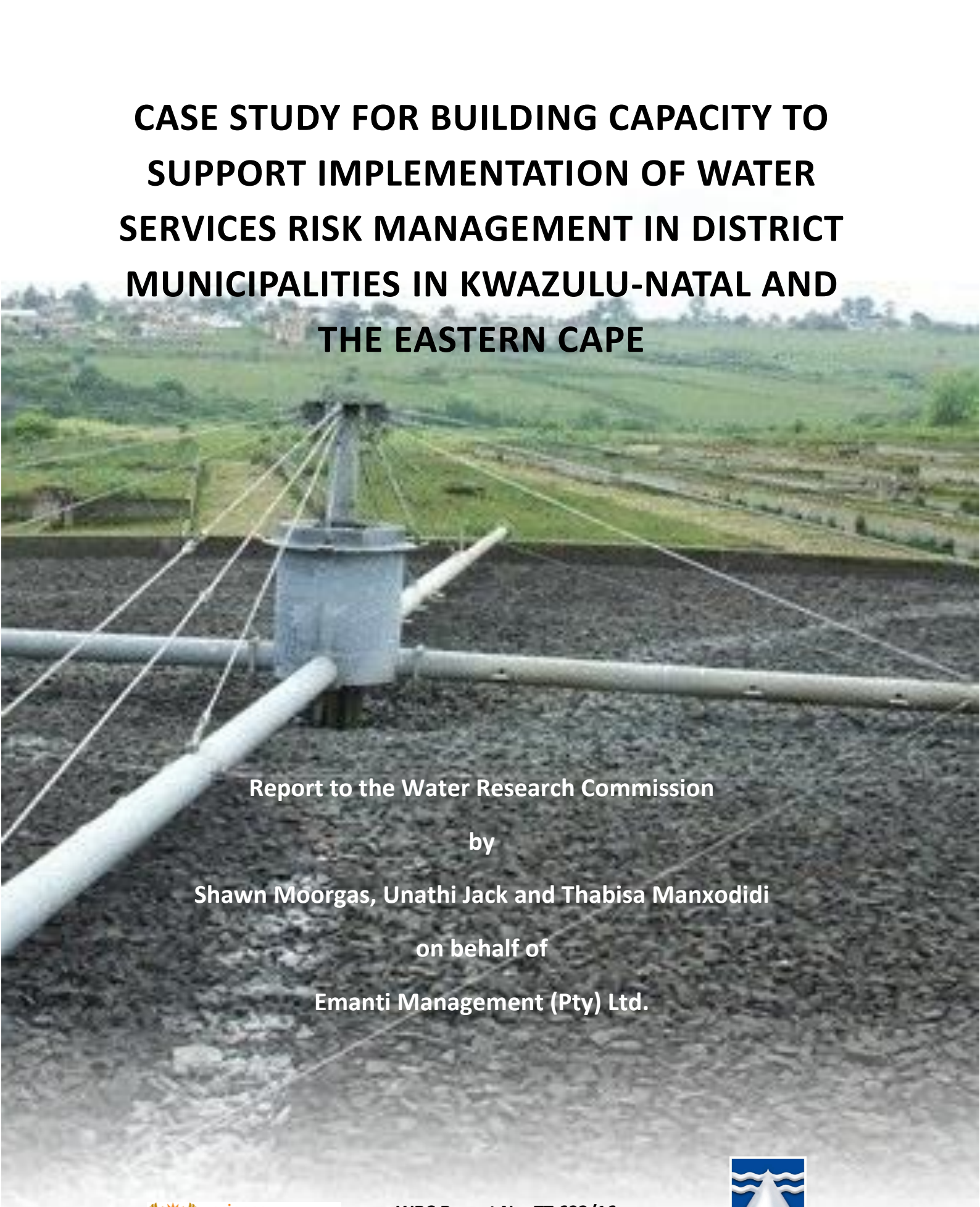
CASE STUDY FOR BUILDING CAPACITY TO SUPPORT IMPLEMENTATION OF WATER SERVICES RISK MANAGEMENT IN DISTRICT MUNICIPALITIES IN KWAZULU-NATAL AND THE EASTERN CAPE



Report to the Water Research Commission

by

Shawn Moorgas, Unathi Jack and Thabisa Manxodidi

on behalf of

Emanti Management (Pty) Ltd.

WRC Report No. TT 693/16

December 2016

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

WATER RESEARCH COMMISSION

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The publication of this report emanates from a project entitled: Case Study for Building Capacity to Support Implementation of Water Services Risk Management in District Municipalities in KwaZulu-Natal and Eastern Cape (WRC Project No. K5/7052)

ISBN 978-1-4312-0858-6
Printed in the Republic of South Africa

EXECUTIVE SUMMARY

From project initiation, it was imperative to understand that this was not a normal water research project. The Department of Science and Technology and its implementing agent, the Water Research Commission were sensitised to the nature of how this project needed to unfold. An “adapt and learn” process was crucial for the project’s success and would strongly rely on the commitment of municipalities and their capacity to work with the project team in improving risk management in both water and wastewater.

Although guided by the World Health Organisation and Department of Water and Sanitation, Water Safety Planning (WSP) and Wastewater Risk Abatement Planning (W_2RAP) approaches vary from institution to institution. It was imperative to understand these varying processes and build on what is already in place. The aim of this project was to use the existing Water Research Commission tools to engage with selected District Municipalities (DMs) within KwaZulu-Natal (KZN) and Eastern Cape (EC) and build capacity on risk based planning for water and wastewater systems. The added advantage is that the project sought to mutually highlight where interventions are required in order to better comply with the criteria of the Blue and Green Drop Certification Programme. Where no risk management was observed, the project team undertook to complete a WSP and/or W_2RAP for one and/or two systems, walk through the process and advise the DM on its implementation plan and in so doing capacitate the DMs to conduct risk management that can be transferred to other systems.

From the initial engagement with the 15 selected Water Service Authorities (WSAs) in KZN and EC a total of 12 WSAs committed to the process. Workshops were conducted with all 12 participating WSAs and action plans for both WSPs and W_2RAPs were developed for implementation. Although successfully completing the action plans for the participating WSAs, certain WSAs found implementation challenging. This can be attributed to the commitment and capacity but was also influenced by the wavering support of the Blue and Green Drop certification programme which seem to have been halted. WSAs need to revitalise the importance of Risk Management in the provision of water and wastewater services to ensure personnel and funds are made available to address key risks identified and implementation of the WSPs, W_2RAPs and Action plans.

In terms of new WSPs and W_2RAPs at identified WSAs the following was undertaken:

Water Safety Planning

- Amajuba (2 systems)
- Zululand (2 systems)
- Uthungulu (2 systems)
- Uthukela (2 systems)
- OR Tambo (1 system)

Wastewater Risk Abatement Planning

- Ugu (2 systems)
- Zululand (2 systems)

The above plans achieved varying levels of progress and where WSAs had strong commitment and capacity, significant progress was observed. Through the process it became clear that many of the WSAs, although

undertaking risk management, lacked the key system and water quality information to inform risk identification and prioritisation.

As part of the project, the project team sought to understand the availability of energy consumption data and sludge management. It was found that this was lacking in almost all of the selected WSAs. As both energy consumption and sludge management are being critically looked at in terms of the 2015 BD and GD criteria. It will be imperative that the WSAs focus efforts to track energy consumption and also comply to sludge management guidelines (Herselman, 2009: volumes 1-5).

In terms of capacity building and knowledge dissemination, 212 persons were exposed on varying levels in relation to risk management in both water and wastewater. This was facilitated through workshops and one on one engagements which proved most beneficial to capacity building and skills development. The attributing factor was the willingness by municipal officials to understand risk management in both Water and Wastewater not only for the improvement of Blue and Green Drop but also as good business practice in supporting service delivery.

Capacity building was further supported by the conducting of a regional workshop in KZN. This workshop formed part of the WISA 2016 Conference. The workshop provided an opportunity for peer on peer discussion as how to tackle risk management and provided a platform to workshop risk management with a diverse group. Sector stakeholders included WSAs, WSPs, Eskom, Water Utilities and professional service providers (PSPs). A total of 33 persons attended the workshop. In addition, a presentation was made at the 2016 Human Settlement conference which sought to provide an insight to human settlements' water and wastewater risk management. One on One engagements and workshops with municipalities during the implementation of risk management, provided a platform to discuss and debate matters and the site visits allowed for the hands-on risk identification and management of water and wastewater.

Based on the initial vulnerability assessment one could observe where WSAs required improvement and support. Through the project and follow-up survey, from a randomly selected group, the results indicated an improved risk management for both water and wastewater. Although there are still areas for improvement, the building of improved capacity and skills can still be observed. Dedicated municipal officials assisted the capacity building process and although the project was subjected to the constant staff turnover of municipal officials, this provided an opportunity to further sensitise new officials to the benefits of risk management. However, with limited commitment of senior management at certain WSAs, the impact in what can be achieved within a project of this nature is directly influenced and is subject to delayed implementation of project activities. It is proposed that for future consideration one is to consider to include the municipal managers (MMs), Portfolio Councillors and Mayors from the beginning. This can be facilitated by utilising the existing regional South African Local Government Association (SALGA) platforms to profile efforts within the respective WSAs. In addition, WSAs need to support that risk teams are made up of multidisciplinary representation of officials whom will jointly drive the progress forward.

When enquiring from municipalities what they felt about the process, the following feedback was noted.
*"King Cetshwayo (Uthungulu) District Municipality's Technical Services officials had a wonderful experience while compiling WSPs with Emanti's highly experienced officials"-**Mr Silver Ngwenya: Process Manager Technical Services***

*"On behalf of the team and I, we would like to thank you guys for equipping us with the necessary skill to do our own Water Safety Plans and Risk Abatement Plans, with the information that you imparted on us, it will help us a lot moving forward in our operational and compliance monitoring. Most of all we would like to thank you for selecting our municipality to be our one of your beneficiaries."-**Ms Luyanda Simelane: Amajuba District Municipality Engineering and Technical Services***

ACKNOWEDGEMENTS

The following organisations and individuals are thanked for their contributions to this project:

Financial Support

Department of Science and Technology

Project Implementation

Water Research Commission

Reference Group

The reference group responsible for this project consisted of the following persons:

- Dr John Ngoni Zvimba — Water Research Commission
- Dr Valerie Naidoo — Water Research Commission
- Zinhle Mchunu — Department of Science and Technology
- Zanele Bila-Mupariwa — Department of Water and Sanitation
- Dr Marlene van der Merwe-Botha — The Water Group
- Lebo Sebola — Lepelle Northern Water
- Petro Bezuidenhout — Magalies Water
- Vusi Ntema — Magalies Water

Participating Municipalities

The following institutions are thanked for their willingness to participate in and enthusiastic support of the project:

- Amajuba (KZN)
- Harry Gwala (KZN)
- Ugu (KZN)
- Umgungundlovu (KZN)
- Umzinyathi (KZN)
- Uthukela (KZN)
- Uthungulu (KZN)
- Zululand (KZN)
- Alfred Nzo (EC)
- Chris Hani (EC)
- Joe Gqabi (EC)
- O R Tambo (EC)

ABBREVIATIONS

BDC	Blue Drop Certification
BDS	Blue Drop System
DM	District Municipality
DST	Department of Science and Technology
DWS	Department of Water and Sanitation
EC	Eastern Cape
GDC	Green Drop Certification
GDS	Green Drop System
IWA	International Water Association
KZN	KwaZulu-Natal
MM	Municipal managers
PSP	Professional Service Provider
RAG	Red, Amber, Green
SALGA	South African Local Government Association
WHO	World Health Organisation
WRC	Water Research Commission
WSA	Water Service Authority
WSP	Water Safety Planning
WWTW	Wastewater Treatment Works
W_2RAP	Wastewater Risk Abatement Plan
SALGA	South African Local Government Association

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CONTENTS

TABLES

FIGURES

1 INTRODUCTION

The most effective means of consistently ensuring functional and effective water/wastewater system infrastructure is through the use of a comprehensive risk assessment and management approach that encompasses all components of the water/wastewater systems. Fundamental to successful execution of such activities is proper planning. South Africa needs effective and efficient systems for providing water services if it is to rise above current challenges and provide high quality services to all its people.

To drive progressive improvement in water and wastewater services provision in South Africa, the Department of Water and Sanitation (DWS) introduced an incentive based regulation scheme, namely Blue Drop Programme for drinking water services and Green Drop Programme for wastewater services. These programmes prescribe key requirements for effective and efficient management of drinking and wastewater by municipalities in South Africa. One of the foundations of the Blue Drop Programme is the use of a Water Safety Planning (WSP) approach to identify and manage risks. Whilst for the Green Drop Programme, the use of Wastewater Risk Abatement Plans (W_2RAPs) approach is used.

When DWS introduced the need for development and implementation of Water Safety Plans by all WSAs (through the Blue Drop Programme), the Water Research Commission (WRC) saw the challenges faced by WSAs in developing Water Safety Plans and therefore initiated projects to both develop a guideline document and spreadsheet/web-based tools to assist WSAs with water safety planning activities. Two WSP tools were developed and web enabled through WRC project to assist municipalities to develop and implement WSPs. The tools were designed using available national and international literature and best practice (e.g. WHO, 2009; Thompson and Majam, 2009, etc.), as well as project team experience to adapt to South African conditions. Thereby the tools are also adaptable for the use in middle-to-low income countries in Africa and elsewhere. One tool assists with the development of WSPs which goes through all typical steps of water safety planning. The second tool assists in identifying where the user is in the WSP implementation process. The initial project was finalised in 2012, however during the course of the project, the BD requirements became more stringent and the South African National Standards (SANS) 241:2011 limits were updated and being practiced. A need to update the tool according to the sector needs was therefore identified. The tool was updated through a follow-up project. A supporting guideline document on how to use the tools was also developed.

During the WRC project that led to the development of the aforementioned spreadsheet and web-based tools, the value and importance of the inclusion of a similar tool for wastewater aspects was highlighted by municipal officials. In a similar fashion, when the development and implementation of W_2RAPs became a requirement and similar difficulties were noted, WRC again funded the development of a W_2RAP guideline. A WRC project was initiated in April 2013 for the development of spreadsheet and web-enabled W_2RAP tools. The project and associated W_2RAP tools follow a similar approach and methodology to that utilised to develop the WSP tools. Lessons learnt through the W_2RAP project will also be used to review and update WSP tools. Therefore, these tools will be continuously reviewed to suit the current sector requirements.

On empowering the municipalities for effective risk management for both water and wastewater, the proposed project plan sought to use these tools to capacitate municipal officials at selected District Municipalities (DMs) within the Eastern Cape (EC) (4 DMs) and KwaZulu-Natal (KZN) (8 DMs) identified within the 23+1DM list to:

1. Conduct a situational analysis of existing WSPs and W_2RAPs in alignment to Blue and Green Drop Programme requirements. Identify gaps and provide recommendations for improved risk management where required.
2. Assist in the drafting of WSPs and W_2RAPs for identified system/s at DMs where there is a lack of risk management.
3. Empower the municipalities through the above implementation to conduct effective risk management.

As the situation and needs within each DM is specific, the project team has developed a flexible project plan that allows appropriate support (including use of WRC developed tools) that will assist DMs to improve their plans, enable effective plan implementation and risk management, and ultimately lead to water services performance improvement.

The WSP and W_2RAP process assists WSAs by prioritising water and wastewater services risks providing targeted support to address gaps and weaknesses. The continuous improvement (plan-do-check-act) focus of the WSP and W_2RAP processes encourages internal performance improvement, through an emphasis on regular performance measurement and better information to inform management decision-making. A key advantage of the WSP and W_2RAP approach is that it serves as a platform for middle managers to engage top municipal management via assessed and documented risks.

2. APPROACH

The following approach was adopted.

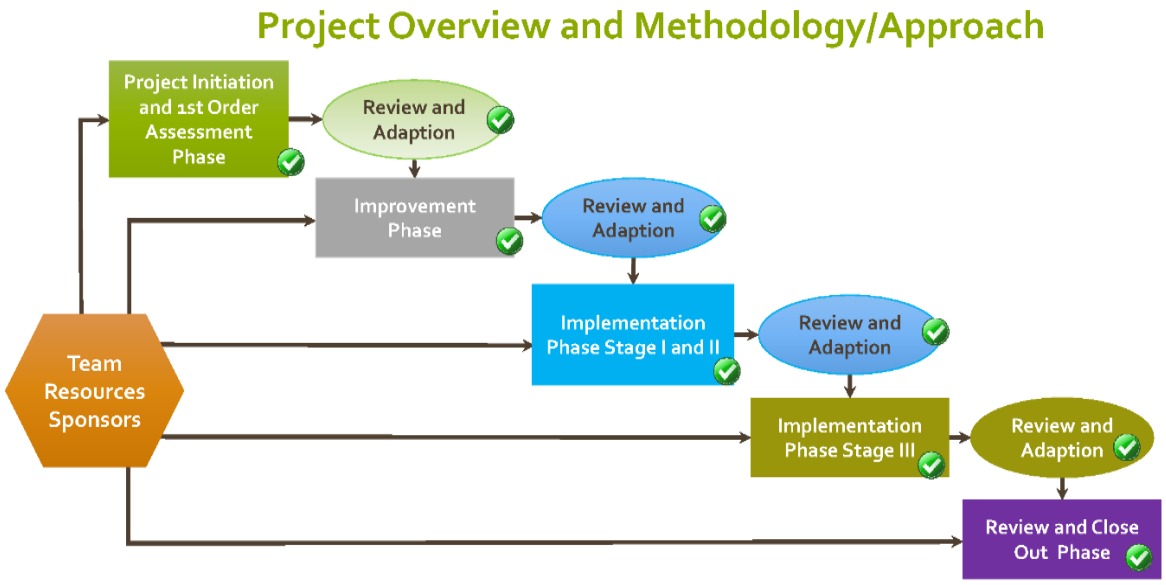


Figure 1: *Project Approach*

3. PROJECT INITIATION AND DESKTOP ASSESSMENT

3.1 Project Initiation

In terms of the WRC project administration protocol a project manager was assigned for both WRC and DST namely:

- WRC Project Manager: Dr Valerie Naidoo
- DST Project Manager: Zinhle Mchunu

During the project however, WRC required to change project manager and Dr John Zimba took over as project manager for the remainder of the project. In addition, it was proposed that Department of Water and Sanitation also form part of the team structure and Mrs Zanele Bila-Mupariwa was approached.

The project focused on the provinces of the Eastern Cape (EC) and KwaZulu-Natal (KZN). 15 Water Service Authorities were selected, 10 in KZN and 5 in the EC, as shown below.

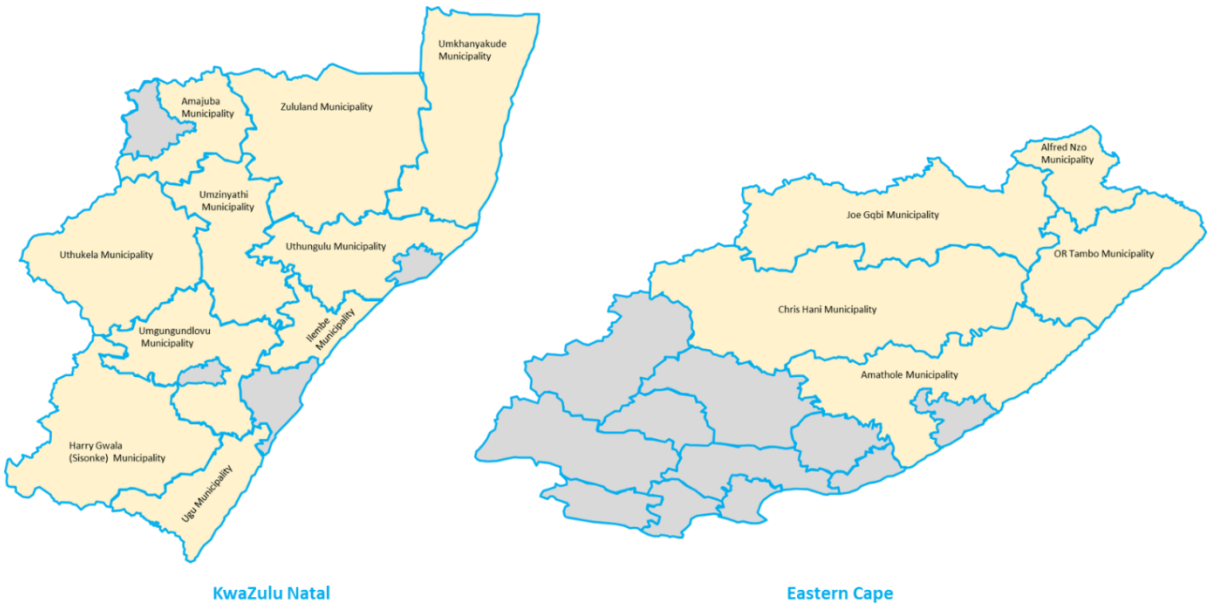


Figure 2: *Selected WSAs within KZN and EC*

In efforts to better understand the current status and willingness for municipalities to be part of the process, a preliminary engagement process was undertaken with the DMs through the following avenues:

1. Engagement with KZN DMs at a regional workshop and EC telephonically as to willingness to participate and value of such an initiative.
2. Establishment of the current status of WSPs and W_2RAPs within KZN and EC.

3.1.1 Engagements with District Municipalities in KZN and EC

Preliminary engagements with the WSAs revealed that:

- 10 WSAs indicated that they require support in improving the Water Safety Planning Processes
- 11 WSAs indicated that they require support in improving Wastewater Risk Abatement Planning Processes
- 1 WSA did not require support in either WSP or W_2RAPs and

- 2 WSAs were not responsive to the efforts of the project team

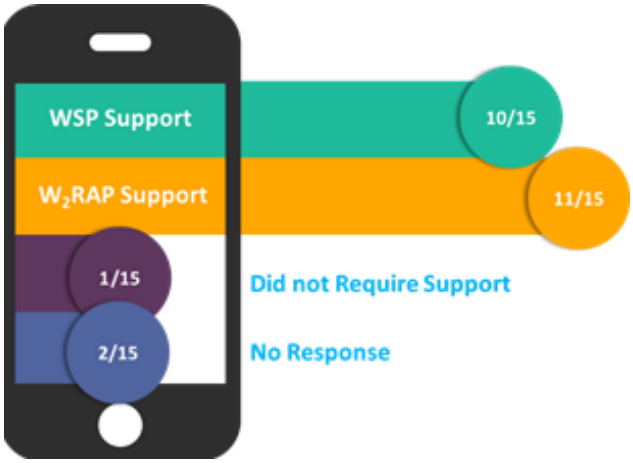


Figure 3: *Preliminary Engagements*

In efforts to support participation, the project team requested written confirmation from the WSAs whom were willing to participate. Nine WSAs returned their written confirmation with five WSAs provided verbal commitment which left one WSA with no indication to participate. Of the 15 selected WSAs, 12 WSAs confirmed their willingness to participate with the exception of Amathole whom are comfortable with both their Water Safety Planning and Wastewater Risk Abatement Processes and did not require further support.

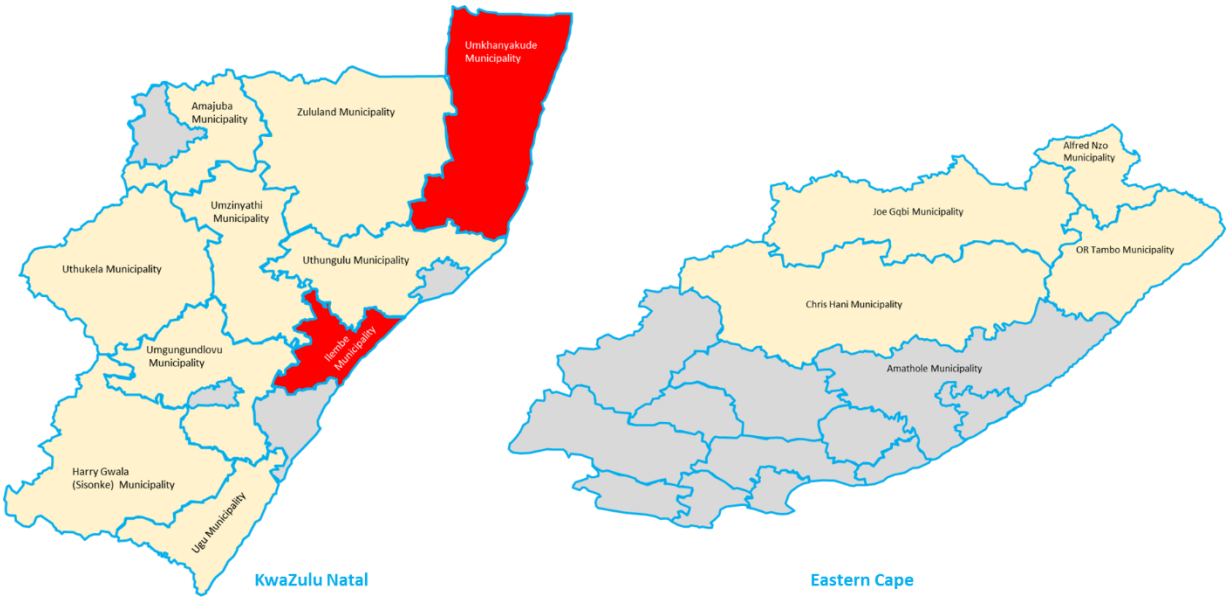


Figure 4: *Final Participating WSAs*

3.1.2 Status of WSPs and W$_2$RAPs in KZN and EC

The following was the outcome of the preliminary analysis:

Water Safety Planning

Table 1: *WSP Status and BDS Scoring*

DM	Region	Systems Exercising Water Safety Planning	Average Score 2012 BDS Report
Alfred Nzo	Eastern Cape	4/4	37.75
Chris Hani	Eastern Cape	21/22	70.05
Joe Gqabi	Eastern Cape	10/10	77.40
OR Tambo	Eastern Cape	22/25	22.24
Amajuba	KwaZulu-Natal	6/6	83.83
Harry Gwala	KwaZulu-Natal	13/13	65.15
Ugu	KwaZulu-Natal	16/16	86.69
Umgungundlovu	KwaZulu-Natal	13/13	85.46
Umzinyathi	KwaZulu-Natal	12/12	82.75
Uthukela	KwaZulu-Natal	13/13	65.62
Uthungulu	KwaZulu-Natal	12/12	50.75
Zululand	KwaZulu-Natal	36/36	72.97

Based on Table 1 and evaluation of the systems the following is noted:

1. Data was sourced from the 2012 BDS report and captures the Water Safety Planning Criteria.
2. All DMs were observed to be practicing some form of Drinking Water Risk Management.
3. The risk management however varied from system to system.
4. Some systems were observed to have no risk management in place.
5. Some DMs indicated an extremely low level of risk management throughout all systems e.g. Alfred Nzo (EC) and OR Tambo (EC).
6. Some municipalities relied on Water Services Providers and Professional Service Providers (PSPs) to develop risk management plans.

Wastewater Risk Abatement Planning

Table 2: *W_2RAP Status and GDS Scoring*

DM	Region	Systems Exercising Wastewater Risk Abatement Planning	Average Score 2013 (Dr Marlene van der Merwe Botha)
Alfred Nzo	Eastern Cape	5/5	58
Chris Hani	Eastern Cape	16/16	33
Joe Gqabi	Eastern Cape	16/16	72
OR Tambo	Eastern Cape	8/10	32
Amajuba	KwaZulu-Natal	4/4	53
Harry Gwala	KwaZulu-Natal	9/9	74
Ugu	KwaZulu-Natal	20/20	87
Umgungundlovu	KwaZulu-Natal	6/6	93
Umzinyathi	KwaZulu-Natal	5/8	36
Uthukela	KwaZulu-Natal	9/9	50
Uthungulu	KwaZulu-Natal	13/13	11
Zululand	KwaZulu-Natal	10/14	36

Based on the above and the evaluation of the systems, the following is noted:

1. Data was sourced from the 2012 Green Drop Progress Report and 2013 data was supplied by Dr Marlene van der Merwe Botha.
2. All DMs were observed to be practicing some sort of Wastewater Risk Management though some systems have no risk management.
3. Again the risk management varied from system to system.
4. There was an increase in the number of DMs with extremely low level of risk management throughout all systems e.g. Uthungulu (KZN), OR Tambo (EC), Chris Hani (EC) and Zululand (KZN).
5. Some municipalities relied on Water Services Providers and PSPs to develop plans.

Overall, municipalities varied in their approaches to Risk Management. Some opted to focus on the WSPs and others on W_2RAPs thereby focusing resources. However, there were instances where both risk management processes for water and wastewater were aligned.

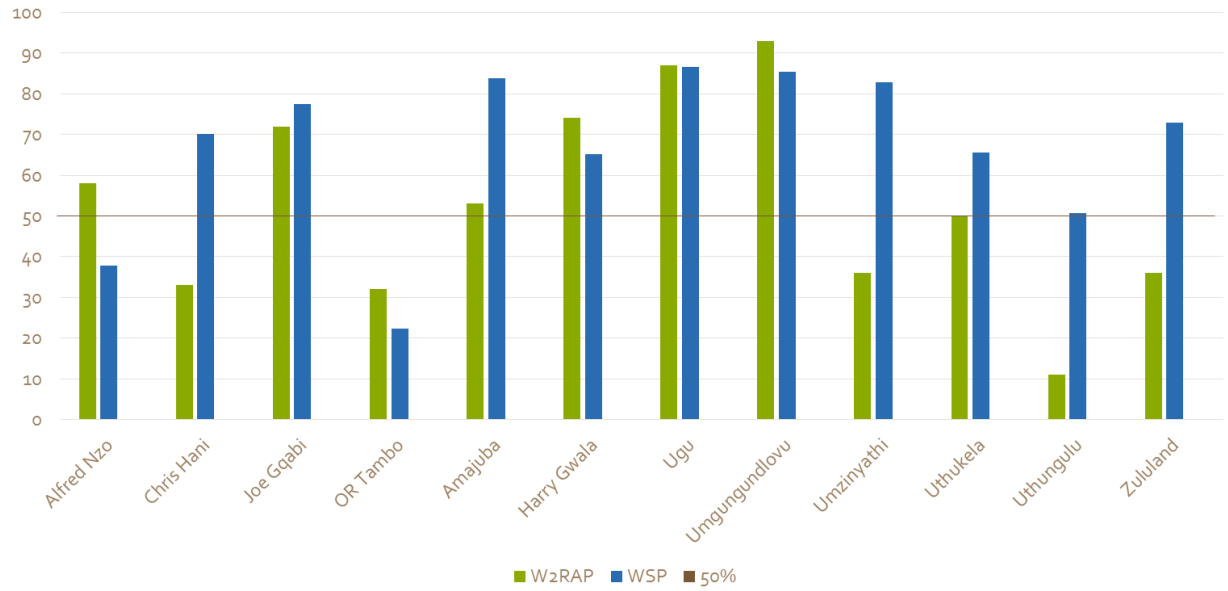


Figure 5: *WSP and W_2RAP Varying Levels of Risk Management*

3.2 Desktop Assessment

To further support the preliminary assessment and to understand the areas within the WSPs and W_2RAPs that require improvement, WSPs and W_2RAPs were sources from the participating 12 WSAs. These plans were assessed using WRC WSP and W_2RAP Checklist Assessment Tools. The tools follow the process of a standard drafting of a WSP and W_2RAP process as indicated by the WHO (2009).

Eight key health attributes with 5 essence questions was then used to determine where in the risk management process WSAs are vulnerable and require improvement. The eight key health attributes include:

1. WSP/W_2RAP Team
2. Water/Wastewater Supply System Assessment
3. Hazard and Risk Assessment

4. Control Measures & Corrective Actions
5. Monitoring & Verification
6. Management Procedures & Supportive Programmes
7. Documentation & Communication Procedures
8. Water Safety/Wastewater Risk Abatement Plan Review

Each of the 12 WSAs were assessed according to the above health attributes and received a spider diagram output to indicate areas of vulnerability that require improvement.

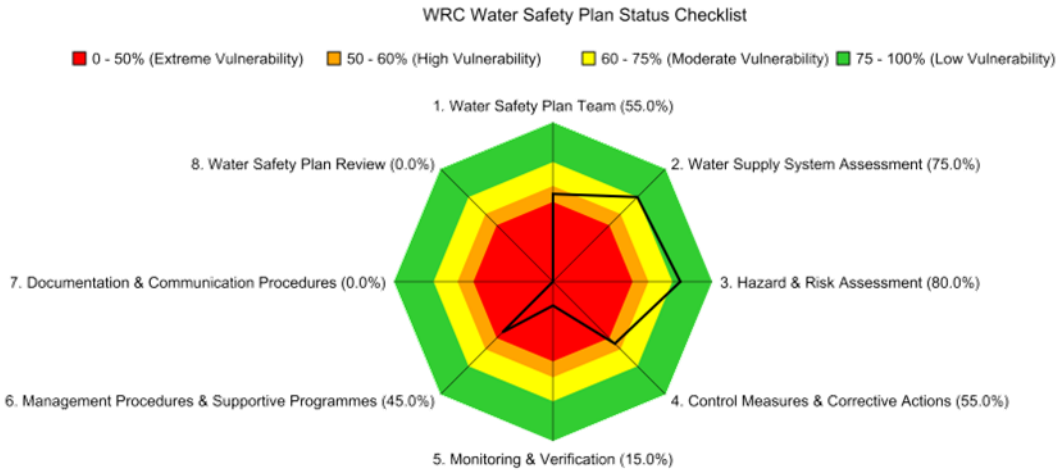


Figure 6: *Typical WSP Spider Diagram Output*

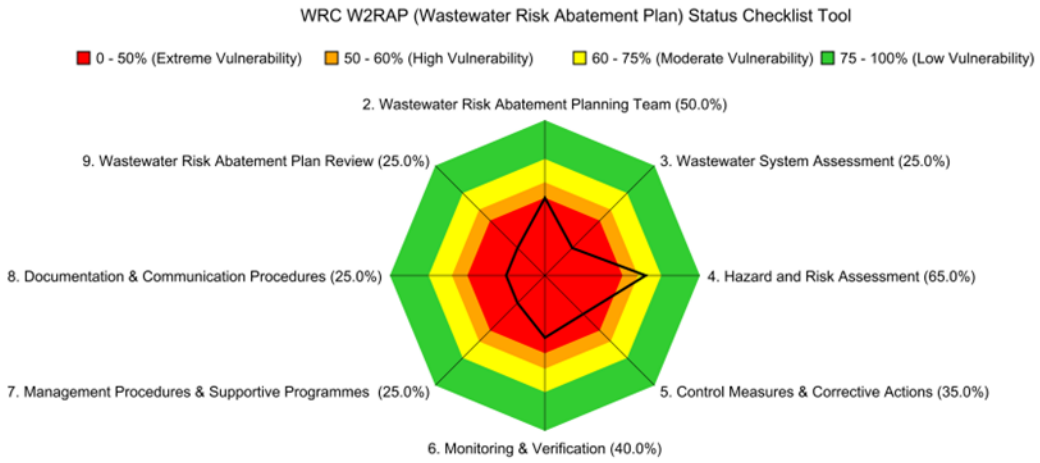
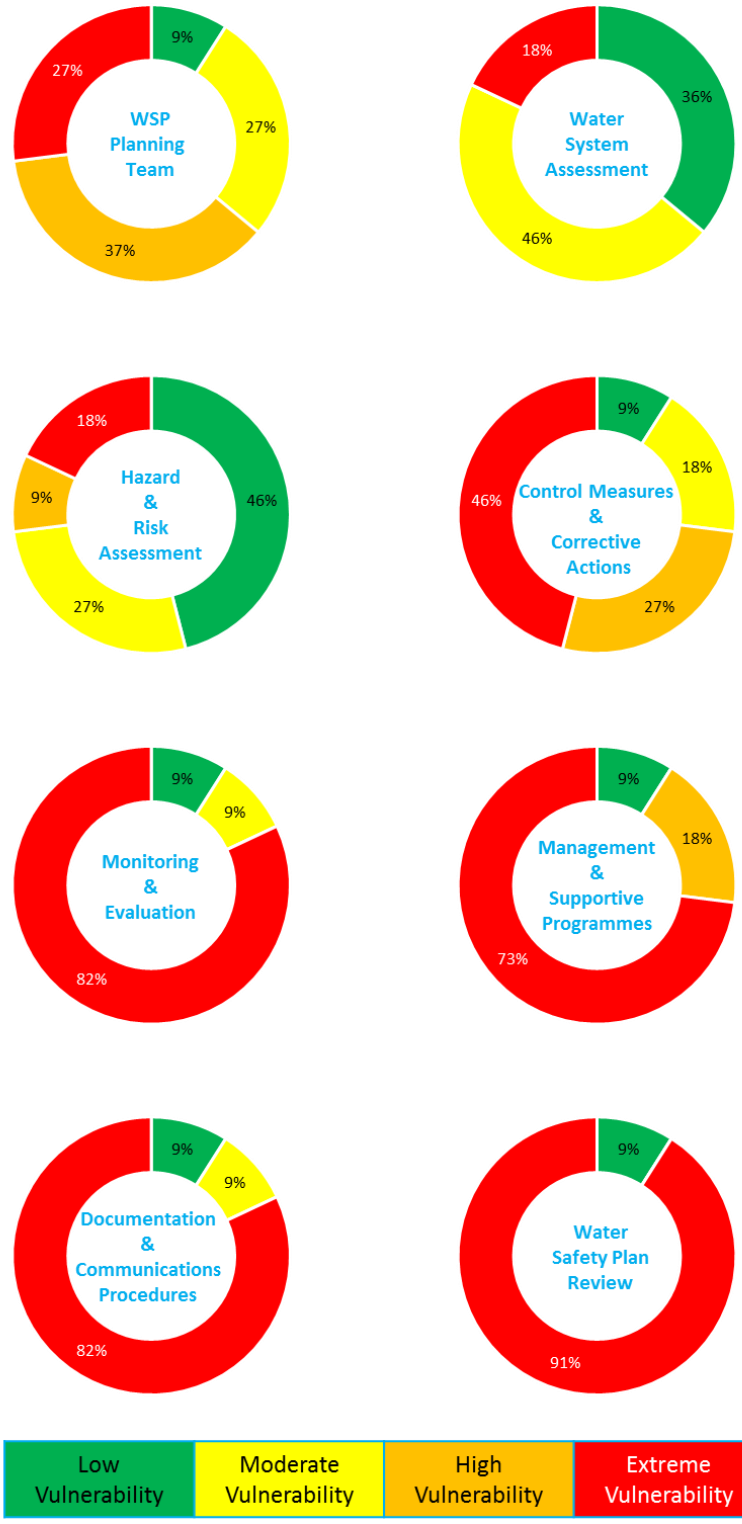


Figure 7: *Typical W_2RAP Spider Diagram Output*

The following indicates the overall summary of Water Safety Risk Planning vulnerabilities after assessments were conducted at all 12 WSAs.

Overall Water Risk Planning Vulnerability Summary



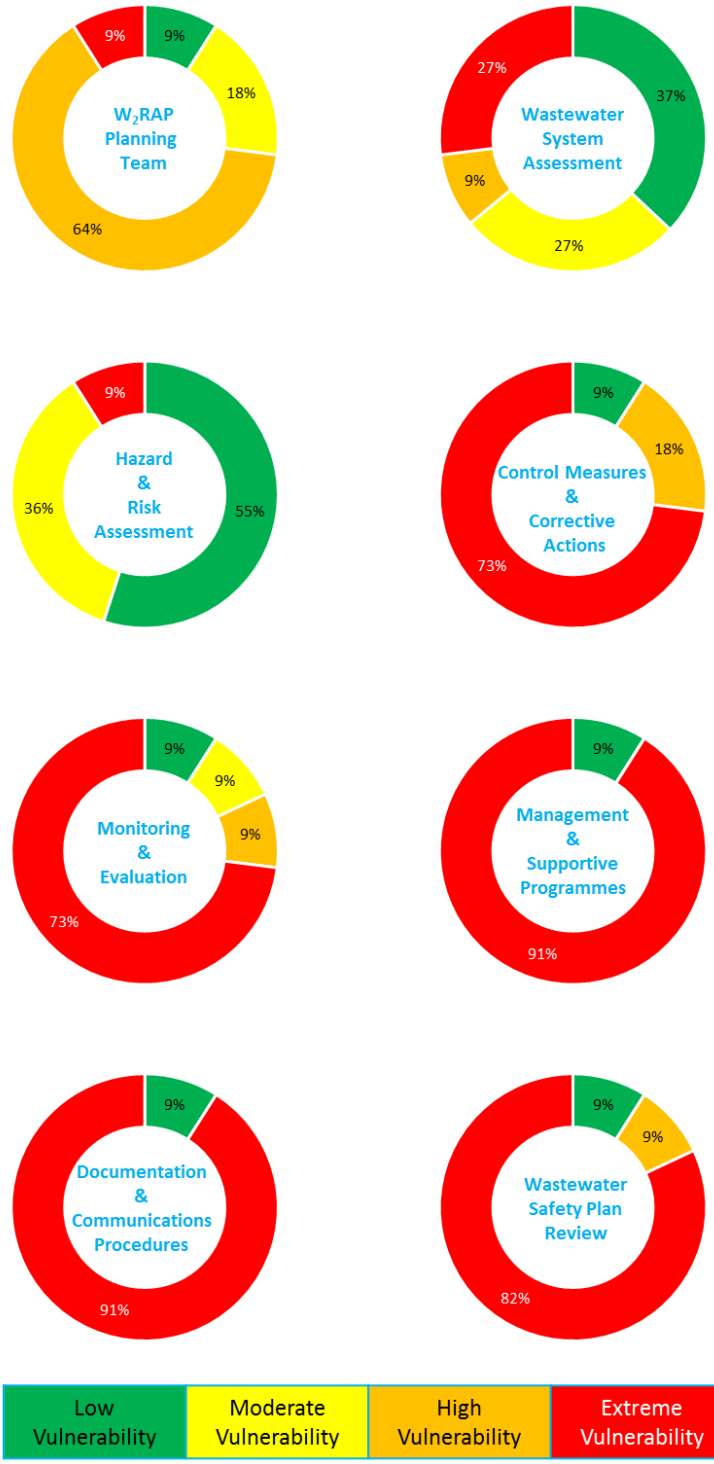
From the assessment of the Water Safety Planning processes at the 12 participating WSAs high vulnerability was observed in the following key health attributes:

- Monitoring and Evaluation
- Management and Support Programmes
- Documentation and Communications Procedures
- Water Safety Plan Review

These areas of improvement were facilitated within the working sessions with the WSAs for the crafting of practical actions in the development of their respective improvement plans.

The following indicates the overall summary of Wastewater Risk Abatement Planning vulnerabilities after assessments were conducted at all 12 WSAs.

Overall Wastewater Abatement Risk Planning Vulnerability Summary



From the assessment of the Wastewater Risk Abatement Planning processes at the 12 participating WSAs high vulnerability was observed in the following key health attributes.

- Control Measures and Corrective Actions
- Monitoring and Evaluation
- Management and Support Programmes
- Documentation and Communications Procedures
- Wastewater Risk Abatement Planning Review

These areas of improvement were facilitated within the working sessions with the WSAs for the crafting of practical actions in the development of their respective improvement plans.

4. SKILLS TRANSFER AND IMPROVEMENT PLANS

Working sessions were facilitated at all 12 WSAs and used the following format which also constituted the agenda for the day.

- WSP/W_2RAP Overview
- WSP Assessment Tool outputs verification
- WSP Improvement Plan
- W_2RAP Assessment Tool outputs verification
- W_2RAP Improvement outputs plan
- Way Forward

The overview was structured in the form of a presentation which provided:

- Background to how the project came about,
- The Project Programme,
- General Desktop Assessment Findings,
- Desktop Assessment specific results/ outputs to the DM being presented to,
- Structure and format of the Improvement Plan Workshop, and
- Insights into how Capacity Building will take place throughout the project.

Figure 8: *Extract from Working Session Presentation*

The verification of the assessment and the improvement plan outcomes were facilitated via the www.riskq.co.za tool box (see figure below). Where internet coverage was limited, a supported Excel worksheet was used.

RiskQ

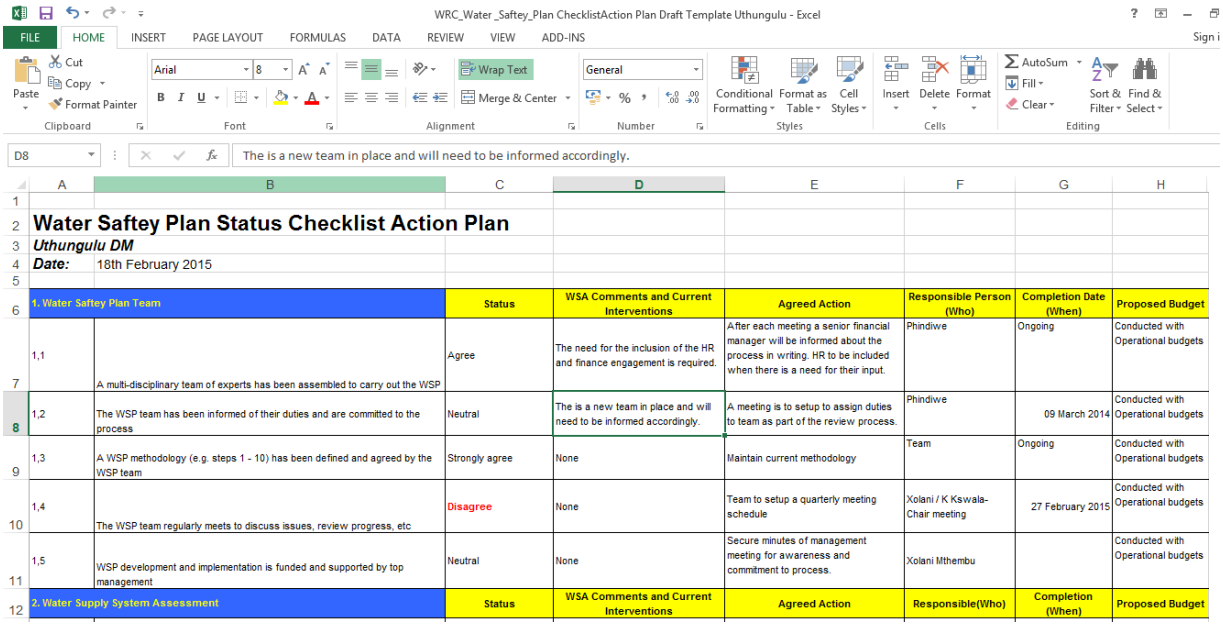
UTHUKELA DISTRICT MUNICIPALITY

shawnudm Toolbox Logout

WRC Water Safety Plan Status Checklist

1. Water Safety Plan Team	Status	Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion (When)	Proposed Budget	Completed
A multi-disciplinary team of experts has been assembled to carry out the WSP	Agree (substantially complete/in place)						
The WSP team has been informed of their duties and are committed to the process	Agree (substantially complete/in place)						
A WSP methodology (e.g. steps 1 - 10) has been defined and agreed by the WSP team	Agree (substantially complete/in place)						
The WSP team regularly meets to discuss issues, review progress, etc	Strongly disagree or don't know (not started)						
WSP development and implementation is funded and supported by top management	Disagree (just started)						
2. Water Supply System Assessment							
3. Hazard & Risk Assessment							
4. Control Measures & Corrective Actions							
5. Monitoring & Verification							
6. Management Procedures & Supportive Programmes							
7. Documentation & Communication Procedures							
8. Water Safety Plan Review							

Figure 9: *Web Based Improvement Plan Template*



WRC_Water _Saftey_Plan ChecklistAction Plan Draft Template Uthungulu - Excel

D8: The is a new team in place and will need to be informed accordingly.

Water Saftey Plan Status Checklist Action Plan

Uthungulu DM

Date: 18th February 2015

	1. Water Saftey Plan Team		Status	WSA Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion Date (When)	Proposed Budget
7	1,1	A multi-disciplinary team of experts has been assembled to carry out the WSP	Agree	The need for the inclusion of the HR and finance engagement is required.	After each meeting a senior financial manager will be informed about the process in writing. HR to be included when there is a need for their input.	Phindiwe	Ongoing	Conducted with Operational budgets
8	1,2	The WSP team has been informed of their duties and are committed to the process	Neutral	The is a new team in place and will need to be informed accordingly.	A meeting is to setup to assign duties to team as part of the review process.	Phindiwe	09 March 2014	Conducted with Operational budgets
9	1,3	A WSP methodology (e.g. steps 1 - 10) has been defined and agreed by the WSP team	Strongly agree	None	Maintain current methodology	Team	Ongoing	Conducted with Operational budgets
10	1,4	The WSP team regularly meets to discuss issues, review progress, etc	Disagree	None	Team to setup a quarterly meeting schedule	Xolani / K Kswala-Chair meeting	27 February 2015	Conducted with Operational budgets
11	1,5	WSP development and implementation is funded and supported by top management	Neutral	None	Secure minutes of management meeting for awareness and commitment to process.	Xolani Mthembu		Conducted with Operational budgets
12	2. Water Supply System Assessment		Status	WSA Comments and Current Interventions	Agreed Action	Responsible(Who)	Completion (When)	Proposed Budget

Figure 10: *Spreadsheet Based Improvement Plan Example*

The improvement plan documents were then drafted from the outputs of the day's events and followed up engagement with the DM. The WSA and project team then set off to implement the actions captured. Improvement Plans were drafted for both WSPs and W_2RAPs, where applicable, for the participating WSAs. In certain cases, the risk process was outdated and the WSA chose to rather focus on the development of new WSPs/W_2RAPs which they could then apply to all systems. This was the case within Uthukela (KZN) which had recently completed a comprehensive W_2RAP process however, the WSP process was too outdated to improve upon, and the WSA opted to start a new process for two of their systems. Once completed, the WSA would take the experience and knowledge gained and apply this to the remaining systems.

The working sessions served as a platform for skills transfer as there was attendance from a diverse skills base.

5. WATER SAFETY PLANNING SUPPORT

5.1 Improvement Plans Outcomes

As indicated previously in section 4, WSP improvement plans were developed at the initial workshops where the project team and the DM discussed the status of the existing WSPs and identified the areas needing improvement. Identified actions were assigned to responsible persons to carry out those actions. Time allocations were made for completion of the identified actions. Based on the outcomes of the improvement plans, a joint effort between the project team and the DM was facilitated to support that the items captured for action were being implemented. As part of the process, the DMs managed certain aspects internally and others required the support of the project team.

Technical support in relation to the above items was provided through various mechanisms namely:

- Telephonic and email engagement.
- One on One Site Visits.

5.2 Site Visits for Identified Water Safety Planning Systems

Subject to further engagements with DMs for the development of new WSPs, the following sites were identified through the workshop engagements with DMs. Site visits were conducted in the presence of the project team and DM representatives. The source (where possible), treatment works and some components of the distribution network were visited for each of the identified systems. DMs were capacitated on how to identify hazardous events and related hazards during the process. Site visits were arranged and conducted as follows:

Table 3: *WSP Site Visits*

DM	Region	WSP
Amajuba	KZN	Dannhauser and Durnacol Water Supply Systems
Zululand	KZN	uLundi and uPongolo Water Supply System
Uthungulu	KZN	Greater Mthonjaneni and Middledrift Water Supply Systems
Uthukela	KZN	Ekuvukeni (Oliphantskop) and Winterton (Khethani) Water Supply Systems

The project team engaged with the following officials at the respective municipalities.

Amajuba District Municipality

Name	Role/Designation
T Zulu	Director: Technical and Engineering Services
L Simelane	Process Technician
L Thwala	Superintendent

Zululand District Municipality

Name	Role/Designation
B Mnguni	Water Service Authority Manager
S Ngubane	Deputy Director Technical
T Mabika	Operations Manager
T L Gumede	Principal Superintendent

uThungulu District Municipality

Name	Role/Designation
S Ngwenya	Process Manager
P Hlalatu	Process Technician

uThukela District Municipality

Name	Role/Designation
M Sibeko	Blue Drop Co-ordinator
C Coetzee	Scientific Services

5.3 Risk Identification and Management Workshops

Following site visits, workshops were held by the project team and the DM representatives. The purpose of the workshops was to discuss known and possible hazardous events for each component of the system. Risk prioritisation and rating, by identifying the likelihood and consequence of the identified hazards/hazardous events, were discussed. Improvement actions for the identified hazardous events were developed and assigned to respective persons. Time was allocated against the identified improvement actions.

The following steps of WSP development and implementation were discussed by the project team and the respective DMs. Some of the management procedures and communication protocols were identified as corrective actions required. In such cases, DMs were guided on how to develop such and standard templates were provided where applicable.

Assemble WSP Team	Describe and Assess WSP System	Identify Hazards and Hazardous Events	Determine Risk Profile through Risk Matrix	Prioritize Risks through DM Workshop	Identification of associated improvement actions

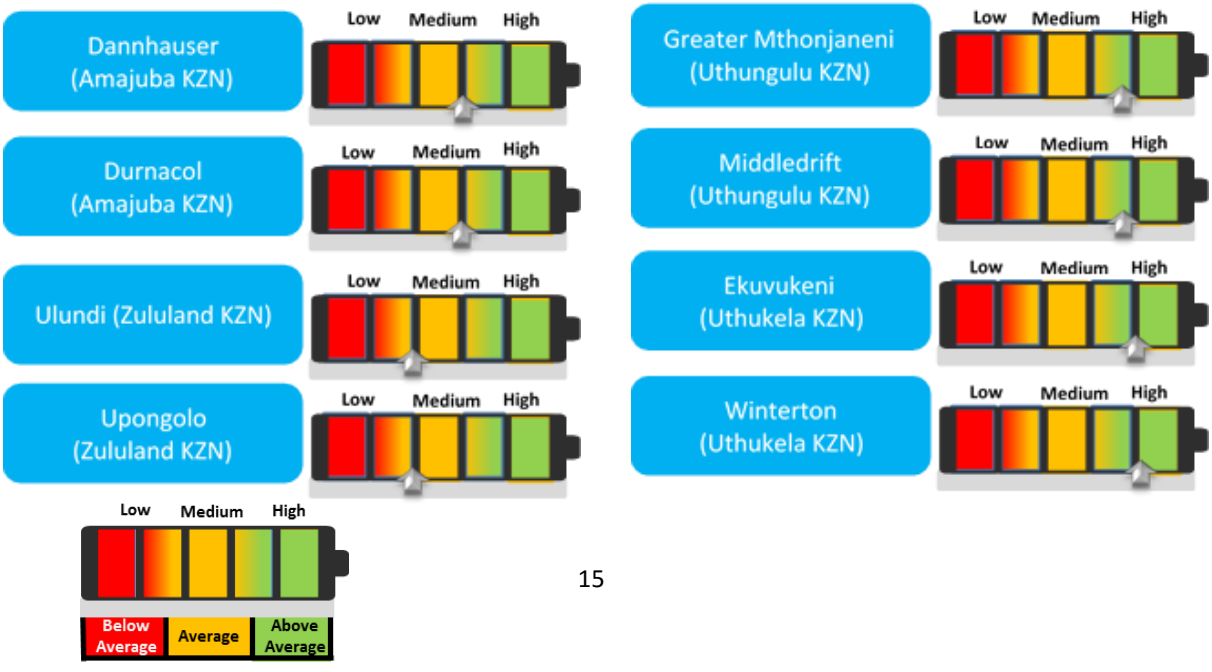
5.4 Water Safety Plan Documents Developed

Completeness of the developed WSP documents are at varying levels. This is due to a number of factors which are noted in Table 4.

Table 4: *Risk and Opportunities WSP*

DM	Risks	Opportunities
Amajuba	• Lack of information transfer between the PSP and the DM resulted in lack of required information. • Insufficient number of process controllers and inadequate skills may be having an impact on management of the systems.	• Management buy-in, willingness and commitment of the DM team brought positive results to the process. • DM started drafting WSPs for other two systems using guidance from the project. • The continuous engagements between the project team and the DM officials strengthened the process and municipal official's confidence in drafting the plans.
Zululand	• Lack of verified information hampered the progress and affected how risks are identified and categorised. • Insufficient number of process controllers for some systems may be having an impact on management of the systems.	• Strong team from the PSP that assists the municipality with operations and maintenance contributed positively to the DMs capacity challenges. • Top and middle management team was available and enthusiastic about the process, therefore, support from management was noted as a positive in taking the process forward.
Uthukela	• Lack of verified information as well as unapproved O&M manuals hampered the progress and affected how risks are identified and categorised. • Water Quality data irregularities on the Blue Drop System (BDS) affected risk analysis. • Challenged personnel capacity affected the return of required information for document finalisation.	• The new members were assigned to the WSP process and were eager to form part and progress. • Laboratory officials were made available to assist in water quality data irregularities. • Monitoring and review process emphasised the importance of sustainable risk management post project completion.
Uthungulu	• Lack of verified information hampered the progress and affected how risks are identified and categorised. • Challenged personnel capacity affected the return of required information for document finalisation.	• The new members were assigned to the WSP process and were eager to form part and progress. • Monitoring and review process emphasised the importance of sustainable risk management post project completion.

Due to the aspects mentioned in the table above, the status of developed WSP documents can be categorised as follows.



Legend:

The project team looked at the following:

- Completeness of the WSP step process undertaken – Assemble Team, System Assessment and Description, Risk Identification, Control Measure identification, etc.
- Completeness and accuracy of information supplied.
- Overall completeness of supporting documents.

Within each of the WSP, the project team clearly indicated the sections that the WSAs need to focus on, post project completion, in efforts to support the completeness of each plan.

6. WASTEWATER RISK ABATEMENT PLANNING DRAFTING AND IMPLEMENTATION

6.1 Improvement Plans Outcomes

As indicated in section 4 above, W_2RAP improvement plans were developed at the initial workshops where the project team and the DM discussed the status of the existing W_2RAPs and identified the areas needing improvement. Actions identified were assigned to responsible persons to carry out those actions. Time allocations were made for completion of the identified actions. Based on the outcomes of the improvement plans, a joint effort between the project team and the DM was facilitated to support that the items captured for action were being implemented. As part of the process, the DMs managed certain aspects internally and others required the support of the project team.

Technical support in relation to the above items were conducted through various mechanisms namely:

- Telephonic and email engagement.
- One on One Site Visits.

6.2 Site Visits for Identified Wastewater Risk Abatement Plans

Subject to further engagements with DMs for the development of new W_2RAPs, the following sites were identified through the workshop engagements with DMs. Site visits were conducted in the presence of the project team and DM representatives. The wastewater treatment works and selected pump stations were visited for each of the identified systems. DMs were capacitated on how to identify hazardous events and related hazards during the process. Site visits were arranged and conducted as follows.

Table 5: *W_2RAP Site Visits*

DM	Region	W_2RAP
Ugu	KZN	Gamalakhe and Shelly Beach Wastewater Supply Systems
Zululand	KZN	Nongoma and Ulundi Wastewater Supply Systems

The project team engaged with the following officials at the respective municipalities.

Ugu District Municipality

Name	Role/Designation
L Cele	General Manager
R Mlambo	Operations and Maintenance Manager
A Zungu	Operations and Maintenance Manager

Zululand District Municipality

Name	Role/Designation
B Mnguni	Water Service Authority Manager
S Ngubane	Deputy Director Technical
T Mabika	Operations Manager (PSP)
T L Gumede	Principle Superintendent

6.3 Risk Identification and Management Workshops

Following site visits, workshops were held by the project team and the DM representatives. The purpose of the workshops were to discuss known and possible hazardous events for each component of the system. Risk rating, by identifying the likelihood and consequence of the identified hazards/hazardous events, were discussed. Improvement actions for the identified hazardous events were identified and assigned to respective people. Time was allocated against the identified corrective actions. Workshops were arranged and conducted.

The following steps of WSP development and implementation were discussed by the project team and the respective DMs. Some of the management procedures and communication protocols were identified as improvement actions required. In such cases, DMs were guided on how to develop such and standard templates were provided where applicable.

Scheme/ System Name	Assemble W_2RAP Team	Describe and Assess Wastewater Supply System	Identify Hazards and Hazardous Events	Determine Risk Profile through Risk Matrix	Prioritize Risk through DM Workshop

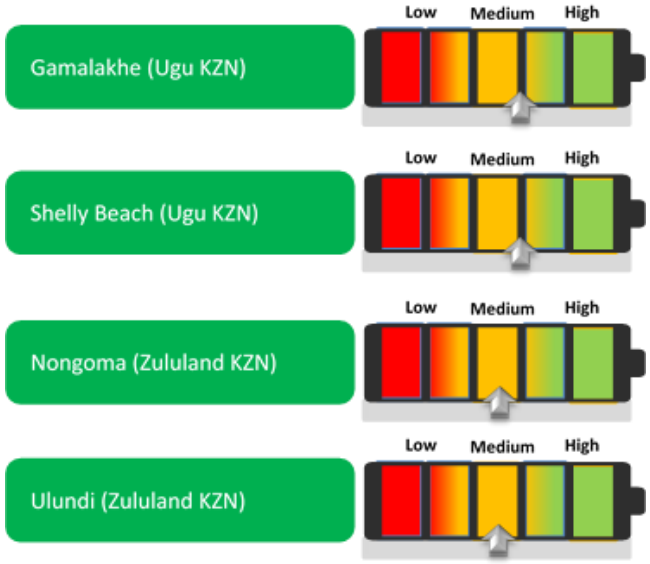
6.4 Wastewater Risk Abatement Plan Documents Developed

W_2RAP processes within newly identified systems are at varying levels. This is due to a number of factors as set out in Table 6.

Table 6: *Risk and Opportunities WSP*

DM	Risks	Opportunities
Ugu	• Lack of information sharing between the PSP and the DM resulted in delay in provision of required information. • Insufficient number of process controllers and inadequate skills may have affected the management of the systems.	• Management buy-in, willingness and commitment of the team brought positive results. • Strong technical team was available with adequate skills to manage W2RAP process. • PSP was contracted to carry process audit for all Wastewater treatment works.
Zululand	• Slow provision of information by the DM hampered the finalisation of the Draft W2RAP. • Insufficient number of process controllers for some systems may have affected the management of the systems.	• Assistance by a PSP on O&M may be having positive contribution to the DMs capacity challenges. • Management buy-in, willingness and commitment of the team brought positive results.

Due to the aspects mentioned in the table above, the status of developed W2RAP documents can be categorised as follows.



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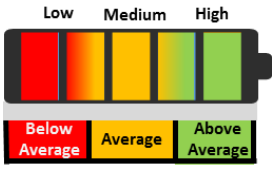


The project team looked at the following:

- Completeness of the W2RAP step process undertaken- Assemble Team, System Assessment and Description, Risk Identification, Control Measure identification, etc.
- Completeness and accuracy of information supplied
- Overall completeness of supporting documents

Within each of the W2RAP, the project team clearly indicated the sections that the WSAs need to focus on, post project completion, in efforts to support the completeness of each plan.

7. CAPACITY BUILDING THROUGH WORKSHOPS

Capacity Building focused on two main areas:

1. Municipal Capacity Building with the target audience being mainly the municipal officials but including sector stakeholders such WSAs, WSPs, Water Utilities PSPs, etc.
2. Internal Capacity Building with the target audience being four World Wide Fund for Nature (WWF) interns and one Department of Water and Sanitation intern.

7.1 Municipal Capacity

Municipal Capacity building and skills transfer within the project was managed through three main focus areas.

- Working sessions with WSAs and the implementation of action plans throughout the duration of the project.
- Technical support in terms of training workshops specifically addressing risk management and its requirements in terms of Blue and Green Drop.
- The use of a formal WSP/W_2RAP processes which imparted the required capacity and skills to undertake such a process independently.

Through the project, across the 12 participating WSAs, a total of 212 persons both male and female were engaged with for knowledge dissemination. Engagement included management to superintendents and process controllers. Smaller groups, per WSA, were often formed to manage the detail of risk management during the project.

WSA	People Engaged with WSPs and W_2RAPs	Total
Alfred Nzo		17
Amajuba		8
Chris Hani		29
Harry Gwala		11
Joe Gqabi		25
OR Tambo		29
Ugu		11
Umgungundlovu		18
Umzinyathi		4
Uthukela		33
Uthungulu		9
Zululand		18
	Total	212

Figure 11: *Risk Management Exposure across Municipalities*

7.1.1 WISA 2016 Workshop

As part of capacity building and feedback, a workshop slot on the WISA 2016 Conference Programme was secured. The conference was held in Durban from the 15- 19 May 2016.

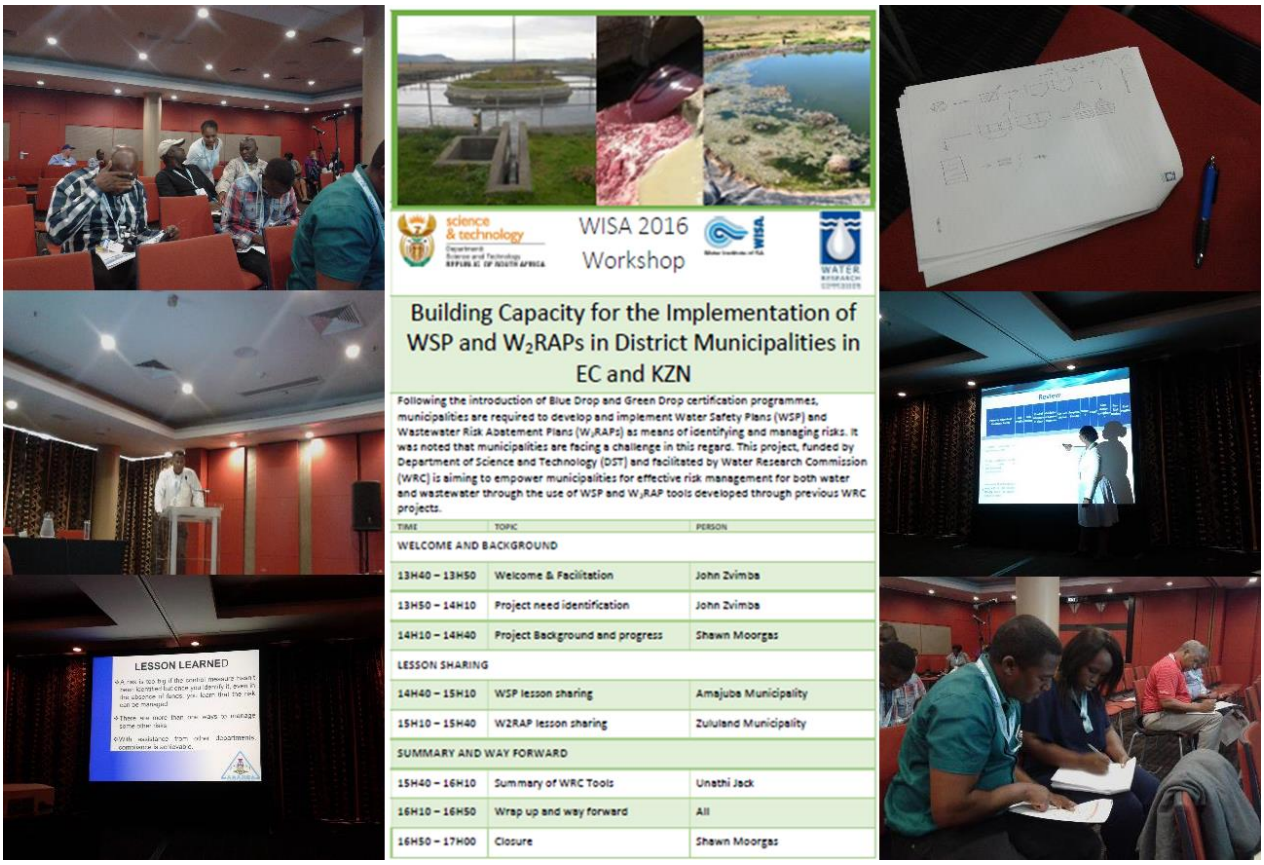
The Water Institute of Southern Africa (WISA) promotes professional excellence in the water sector, through building expertise, sharing knowledge and improving quality of life. It is a professional, comprehensive, independent, volunteer, water sector community institution that provides diverse membership benefits to its more than 3,500 members and supports the African water sector in a representative and effective way. WISA's head office is located in Johannesburg with branches in Kwazulu-Natal, Mpumalanga, Limpopo, the Eastern Cape, the Western Cape, Free State and Namibia.

For the 2016 conference, the pertinent theme adopted was in line with the challenges currently facing the country: ***"Water – The Ultimate Constraint***". The conference's sub-themes included:

- Community Water Supply and Sanitation
- Environmental Aspects
- Health Related Aspects
- Industrial Water and Effluent
- Information Technology
- Legislation
- Management and Institutional Affairs
- Membrane Processes
- Modelling
- Mine Water
- Plant Operation
- Potable Water
- Wastewater
- Development Planning
- Ground Water Remediation
- Fracking

The WSP/W_2RAP workshop programme for the day included:

- Project Need Identification
- Background and Progress
- WSP Lesson Sharing
- W_2RAP Lesson Sharing
- WRC Tools
- Wrap Up & Way Forward



The objective of the workshop was to share lessons learnt by WSAs participating in the project as well as providing a platform for participants of the workshop to also learn the basics of developing WSPs and W_2RAPs.

A total of 33 persons attended the workshop and were affiliated to the following institutions:

- Erwat
- Mapwater
- eThekwini Metro
- Umgeni Water
- Greater Tzaneen Municipality
- Eskom
- Mpumamanzi
- City of uMhlathuze
- Hessequa Municipality
- George Municipality
- Thuthukani SNF Chemicals
- Pucma
- Amathole District Municipality
- Chris Hani District Municipality
- Nketoana Local Municipality
- Joe Gqabi District Municipality
- Amajuba District Municipality
- WRC
- Department of Water and Sanitation

7.1.2 Human Settlement 2016 Workshop

As part of the 2016 National Human Settlements Conference held in Port Elizabeth on the 5th, 6th and 7th October 2016 the project team was given an opportunity within the theme session: *Service Delivery Improvements And Financing Models – Changing Culture, Education Practices, Community Engagement And Financing Options* to present the achievements of the project. The presentation focused on the importance of multi departmental approach in managing water issues.

7.1.3 National Research Foundation/South African Agency for Science and Technology Agent Workshop

On the 25th and 26th August 2016, National Research Foundation (NRF) and South African Agency for Science and Technology Advancement (SAASTA) held a workshop in Gauteng. A presentation on the project was given at the workshop. This led to an increased interest about water safety planning and wastewater risk abatement planning within the SAASTA students. The follow up by the students with the project team and WRC included e-mail communication, conducting telephonic interviews and radio interviews.

7.2 Internal Capacity Building

During the project the team sought to develop Graduate interns as part of the internal capacity building of the project.

The South African National Biodiversity Institute (SANBI) has embarked on a major skills development and job creation piloted in 2013, Groen Sebenza, a Jobs Fund Partnership Project funded by the National Treasury. Groen Sebenza is aimed at developing priority skills in the biodiversity sector to create sustainable job opportunities for 800 unemployed graduates and non-graduates (school leavers with a matric certificate) for a period of two and a half years. Groen (in Afrikaans meaning green) Sebenza (meaning work in isiZulu) brings young South Africans from previously disadvantaged backgrounds together with experienced biodiversity professionals to learn, grow and eventually gain the competence and confidence to embark on rewarding and meaningful biodiversity careers.

The programme partnered with 43 host institutions across the country from all tiers of government, NGO's and the private sector. One of the partners was the World Wide Fund for Nature (WWF). Through WWF four interns we made available and took part in various aspects of the project.

The aim was to equip the participating young people, called Pioneers, with various life and generic skills training e.g. computer literacy, workplace communication, career guidance, leadership and project management skills.

The following four interns were capacitated during this project.

Ms. Awelani Sadiki-
WWF Graduate Intern

Ms. Sisanda Booi-
WWF Graduate Intern

Ms. Zimasa Komsana-
WWF Graduate Intern

Ms. Zizipho Njikenjike-
WWF Graduate Intern

In addition, a Department of Water Affairs and Sanitation Graduate Intern, Rivonia Pillay, was also made available to the team and took part in various aspects for the project.

Ms. Rivonia Pillay-
DWS Graduate Intern

8. MONITORING AND REVIEW

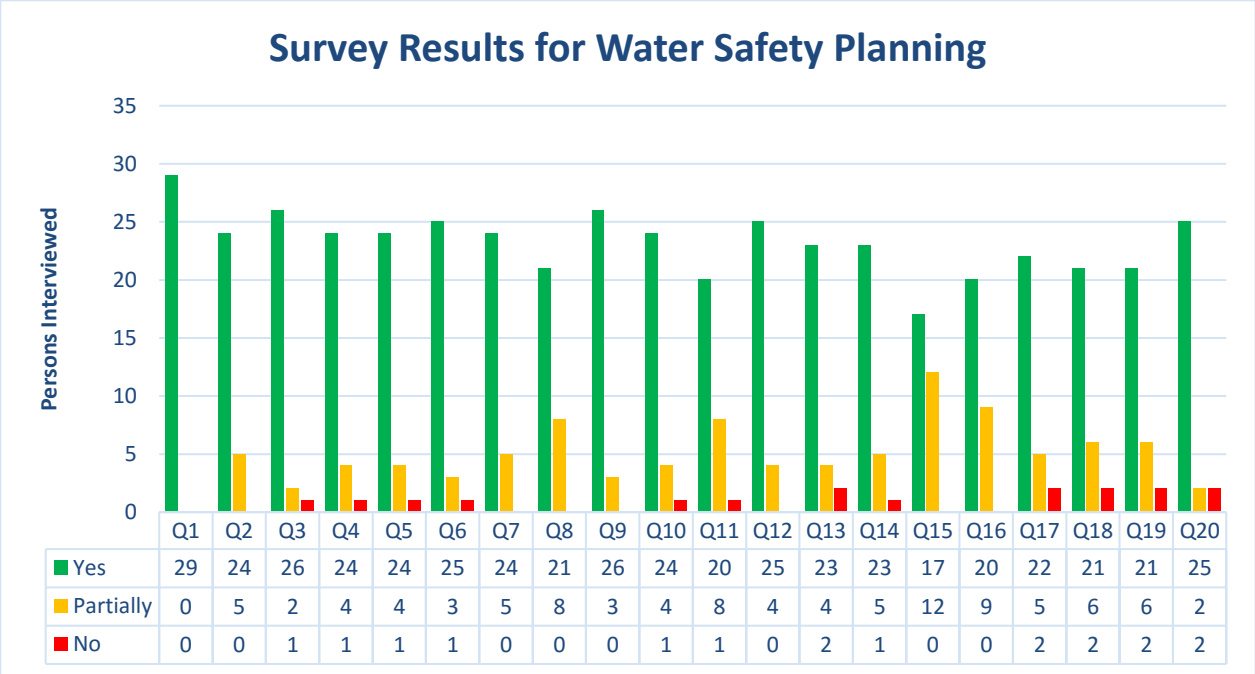
In order to ascertain the impact of the project's progress in relation to the capacity and transfer of skills, the project team approached a selected number of persons involved in the project to undertake a survey. The survey presented 20 questions to capture their understanding of risk management in both water and wastewater. These questions would be rated by the following answers:

- Yes
- Partially
- No

The following lists present the 20 questions that were asked for Water Safety Planning and Wastewater Risk Abatement Planning:

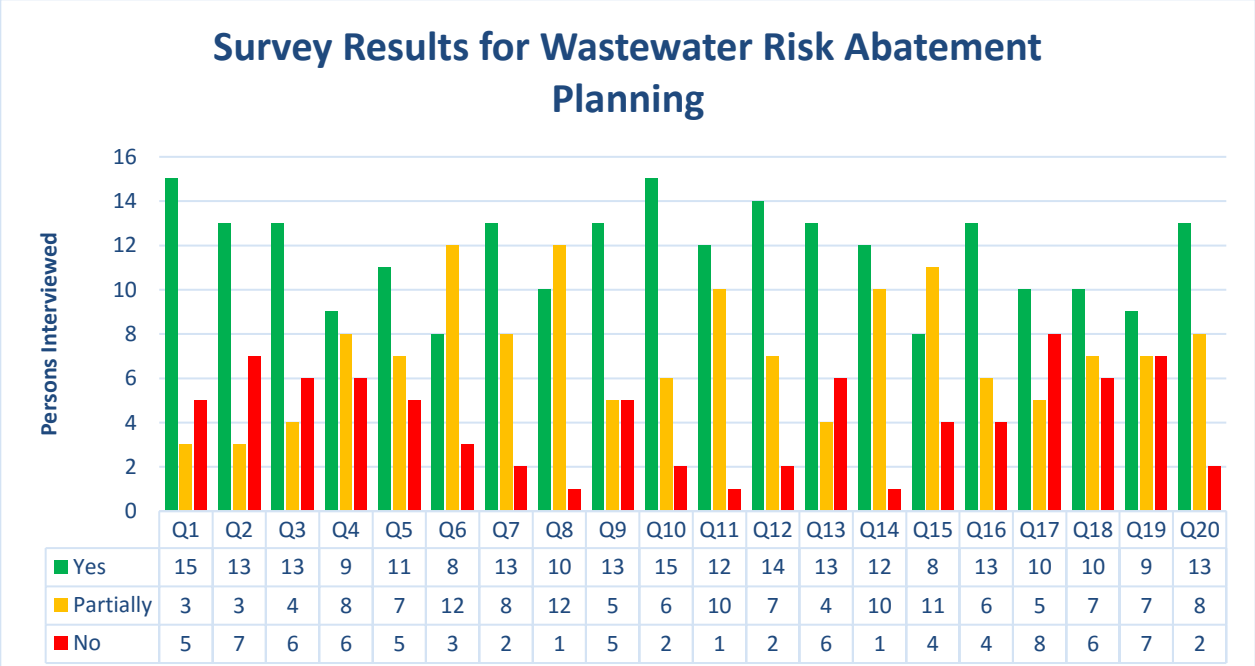
Question No.	Description
Q1	Do you understand the purpose of Water Safety Planning?
Q2	Do you understand the difference between a Water Safety Plan and Water Safety Planning?
Q3	Do you understand how to identify a WSP Team?
Q4	Do you understand how to identify WSP Stakeholders?
Q5	Do you understand how to describe a system?
Q6	Do you understand what to consider when describing a system?
Q7	Do you understand the process of hazard identification?
Q8	Do you understand the process of risk rating?
Q9	Do you understand how to identify control measures?
Q10	Do you understand the process of identifying corrective actions?
Q11	Do you understand the difference between control measures and corrective actions?
Q12	Do you understand what to consider when allocating responsibilities?
Q13	Do you understand the process of allocating time frames?
Q14	Do you understand how to prioritise risks?
Q15	Do you understand how to identify management procedures required?
Q16	Do you know how to identify communication procedures required?
Q17	Do you understand the process of reviewing a WSP?
Q18	Do you understand what is meant by verification of control measures?
Q19	Do you understand what is meant by verification of monitoring programme?
Q20	Do you feel that you can be part of developing a WSP?

A total of 29 persons returned completed WSP surveys and a total of 23 persons returned completed W_2RAP surveys. The following captures the outcomes of both surveys.



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Yes	29	24	26	24	24	25	24	21	26	24	20	25	23	23	17	20	22	21	21	25
Partially	0	5	2	4	4	3	5	8	3	4	8	4	4	5	12	9	5	6	6	2
No	0	0	1	1	1	1	0	0	0	1	1	0	2	1	0	0	2	2	2	2

Question No.	Description
Q1	Do you understand the purpose of Wastewater Risk Abatement Planning?
Q2	Do you understand the difference between a Wastewater Risk Abatement Plan and Wastewater Risk Abatement Planning?
Q3	Do you understand how to identify a W_2RAP Team?
Q4	Do you understand how to identify W_2RAP Stakeholders?
Q5	Do you understand how to describe a system?
Q6	Do you understand what to consider when describing a system?
Q7	Do you understand the process of hazard identification?
Q8	Do you understand the process of risk rating?
Q9	Do you understand how to identify control measures?
Q10	Do you understand the process of identifying corrective actions?
Q11	Do you understand the difference between control measures and corrective actions?
Q12	Do you understand what to consider when allocating responsibilities?
Q13	Do you understand the process of allocating time frames?
Q14	Do you understand how to prioritise risks?
Q15	Do you understand how to identify management procedures required?
Q16	Do you know how to identify communication procedures required?
Q17	Do you understand the process of reviewing a W_2RAP?
Q18	Do you understand what is meant by verification of control measures?
Q19	Do you understand what is meant by verification of monitoring programme?
Q20	Do you feel that you can be part of developing a W_2RAP?



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Yes	15	13	13	9	11	8	13	10	13	15	12	14	13	12	8	13	10	10	9	13
Partially	3	3	4	8	7	12	8	12	5	6	10	7	4	10	11	6	5	7	7	8
No	5	7	6	6	5	3	2	1	5	2	1	2	6	1	4	4	8	6	7	2

In relation to understanding Water Safety Planning the following 3 key areas still require further improvement:

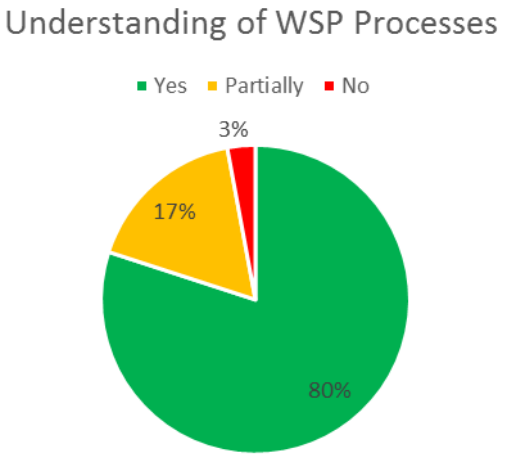
- Understanding the process of risk rating
- Understanding how to identify management procedures
- Identifying communication procedures required

In relation to Wastewater Risk Abatement Planning the following 3 key areas still require further improvement:

- Understanding what to consider when describing a wastewater system
- Understanding the process of risk rating
- Understanding how to identify management procedures

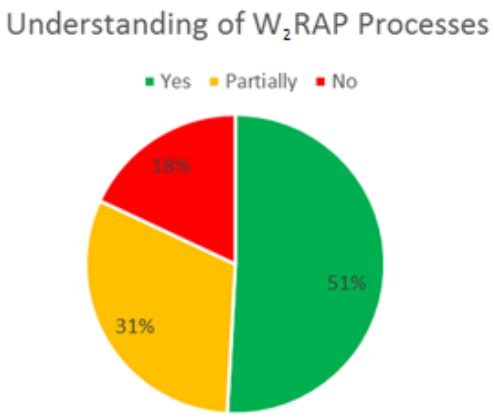
The target group survey showed that in terms of Water Safety Planning:

- 80% showed improved understanding of Risk Management
- 17% showed partial understanding of Risk Management
- 3% indicated lack of understanding of Risk Management



The target group survey showed that in terms of Wastewater Risk Abatement Planning:

- 51% showed improved understanding of Risk Management
- 31% showed partial understanding of Risk Management
- 18% indicated lack of understanding of Risk Management



8.1 Project Lessons Learnt

The Project Biggest Successes:

Description	Factors that Promoted this Success
All targeted 12 WSAs' WSP and W_2RAP processes could be assessed in terms of their vulnerabilities. This provided much needed insight into the varying approaches of WSAs in terms of risk management.	This process was facilitated with WSAs through official letters, telephone calls and emails highlighting the objectives of the project
Action Plans were workshopped and developed for all participating WSAs for both WSPs and W_2RAPs. Municipalities were committed to implementing the actions plans at the time workshops were conducted.	Identifying key personnel for attending of the workshops and gaining insights of their risk management process before conducting the workshop. Project team and client clearly acknowledging the role of PSPs within the processes and inviting them to the workshops and to be part of the project.
Crafting of new WSPs at Amajuba, Zululand, Uthungulu, Uthukela and OR Tambo	Although varying in progress the facilitating of new WSPs provided a platform for capacity building and skills transfer. Progress was dependent on the WSAs commitment and capacity to complete the process.
Crafting of new W_2RAPs at Ugu and Zululand	Although varying in progress the facilitating of new W_2RAPs provided a platform for capacity building and skills transfer. Progress was dependent on the WSAs commitment and capacity to complete the process.
A total of 212 persons from the 12 participating WSAs were engaged with on some level of risk management. This was facilitated through workshops and one on one engagement proved most beneficial to capacity building and skills development.	The willingness by municipal officials to understand risk management in both water and wastewater not only for the improvement of Blue and Green Drop but also as good business practice in supporting service delivery.
Regional and Sector Engagement through WISA 2016 for the understanding and improving of risk management. The workshop provided an opportunity for peer on peer discussion as how to tackle risk management.	The workshop was attended by a diverse amount of sector stakeholders and included WSAs, WSPs, Eskom, Water Utilities and PSPs. The use of the WISA Conference platform to workshop the risk management proved most valuable to encourage the participation from around South Africa.
Improved capacity building and skills development. Based on the initial vulnerability assessment one could see where WSAs required improvement and support. Through the project and follow up survey, from a randomly selected group, indicated an improved risk management for both water and wastewater. Although there are still areas for improvement the building of improved capacity and skills can still be observed.	Dedicated municipal officials assisted the capacity building process and although the project was subjected to the constant turnover of municipal officials, this provided an opportunity to further sensitise new officials to the benefits of risk management. One on One engagements and workshops provided a platform to discuss and debate matters. The addition of the site visits allowed for the hands on risk management of water and wastewater.
Amajuba and Ugu further progressing of risk management to other systems. Based on the progress achieved these two WSAs have already used the knowledge and experienced gained and applied this internally to other systems.	The dedication and commitment by the WSAs risk management staff was the key driving force behind this significant achievement.

Areas of Potential Improvement to be considered for Future Projects:

Description	Factors that would help Promote Future Success
Limited management commitment within certain WSAs and staff turnover. This major contributing factor is a challenge faced by most municipalities within South Africa. This impacts directly on what can be achieved within the project of this nature and is subject to delayed implementation of project activities.	It should be considered for future implementation to include the MMs, Portfolio Councillors and Mayors from the beginning. This can be facilitated by utilising the regional SALGA existing platforms to profile efforts within the respective WSAs. In addition, WSAs need to support that risks teams are made up of multidisciplinary representation of officials whom will jointly drive the progress forward.
Implementation and Review of existing Risk Management Plans. Based on the preliminary work undertaken by the project team it became evident that WSAs, although doing excellent work in setting up WSPs and W_2RAPs, lacked the capacity to implement them. This resulted in the risk management process becoming outdated and redundant.	WSAs need to understand that risk management is a living process that needs constant reviewing, refinement and implementation to ensure that control measures that are identified are put in place or planned for within municipal financial planning structures.
Varying implementation of the Action Plans. Although successfully completing the action plans for the participating WSAs, certain WSAs found implementation challenging. This can be attributed to the commitment and capacity but was also influenced by the wavering support of the Blue and Green Drop accreditation processes which seem to have been halted.	WSAs need to revitalise the importance of risk management in the provision of water and wastewater services to ensure personnel and funds are made available to address key risks identified.
Lack of critical system and water quality information. Through the process it became clear that many of the WSAs, although undertaking risk management, lacked the key system and water quality information to inform risk identification and prioritisation.	WSAs should run parallel processes with their risk management to ensure that information such as: Water and Wastewater works statistical, capacities, flows and system processes are tracked, monitored and documented. Equally important is the trend analysis of water quality compliance data to support the early warning detection of risks.
Energy and sludge management	With the enhanced focus on energy within the context of interrupted supply, the municipalities will need to mitigate the risks associated with the provision of backup power and increased electricity tariffs. Municipalities should investigate the continuous monitoring and analysis associated with water treatment, both potable and wastewater. To support improved environmental protection, municipalities are encouraged to undertake a sludge classification process to determine the most effective mechanisms to manage sludge in terms of re-use and disposal.

Participating WSAs have been continuously encouraged throughout the implementation of the project and post project completion to:

- Implement the action plans formulated.
- Advance mechanisms to capture water and wastewater works statistical, capacities, flows and system processes as well as to perform trend analysis of water quality compliance data to support the early warning detection of risks.
- Utilise the effort achieved through the project and impart knowledge and experience for the furthering of Water Safety Planning and Wastewater Risk Abatement Planning at all systems with the respective municipalities.

9. CONCLUSIONS, WAY FORWARD AND RECOMMENDATIONS

From the project initiation it was imperative to understand that this was not a normal water research project. DST and its implementing agent the WRC were sensitised to the nature of how this project needed to unfold. An “adapt and learn” process was crucial for the project’s success and would strongly rely on the commitment of municipalities and their capacity to work with the project team in improving risk management in both water and wastewater.

In terms of new WSPs and W_2RAPs at identified WSAs the following was undertaken:

Water Safety Plans

- Amajuba (2 systems)
- Zululand (2 systems)
- Uthungulu (2 systems)
- Uthukela (2 systems)
- OR Tambo (1 system)
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Wastewater Risk Abatement Planning

- Ugu (2 systems)
- Zululand (2 systems)

The plans achieved varying levels of progress and, where WSAs had strong commitment and capacity, significant progress was observed. Through the process it became clear that many of the WSAs, although undertaking risk management, lacked the key system and water quality information to inform risk identification and prioritisation. Within each of the WSP and W_2RAP drafted the project team clearly

indicated the sections that the WSAs need to focus on, post project completion, in efforts to support the completeness of each plan.

Amajuba and Ugu did further progress risk management to other systems. Based on the progress achieved, these two WSAs have already used the knowledge and experienced gained and applied this internally to other systems. The dedication and commitment by the WSAs risk management staff was the key driving force behind this significant achievement.

Results from the review process indicated that for Water Safety Planning:

- 80% showed understanding of Risk Management
- 17% showed partial understanding of Risk Management
- 3% indicated lack of understanding of Risk Management

In terms of Wastewater Risk Abatement Planning:

- 51% showed understanding of Risk Management
- 31% showed partial understanding of Risk Management
- 18% indicated lack of understanding of Risk Management

Key Areas for further improvement included for Water Safety Planning:

- Understanding the process of risk rating
- Understanding how to identify management procedures
- Identifying communication procedures required

In relation to Wastewater Risk Abatement Planning the following key areas still require further improvement:

- Understanding what to consider when describing a wastewater system
- Understanding the process of risk rating
- Understanding how to identify management procedures

As the project progressed one of the major contributing factors was the limited management commitment of certain WSAs and staff turnover. This factor is a challenge faced by most municipalities within South Africa, however, it impacts directly on what can be achieved within a project of this nature and is subject to delayed implementation of project activities. It is proposed that for future consideration, one is to consider to include the MMs, Portfolio Councillors and Mayors from the beginning. This can be facilitated by utilising the regional SALGA existing platforms to profile efforts within the respective WSAs. In addition, WSAs need to support the idea that risks teams are made up of multidisciplinary representation of officials who will jointly drive the progress forward. There is still a need to further support risk management in order to ensure the sustainability of what has already being achieved. Some WSAs have already taken the next steps of empowering their internal staff to utilise what they learnt and apply to other systems and this is a notable achievement. On asking municipalities what they felt about the process the following feedback was noted:

Most importantly, to remain sustainable, WSAs need to take forward the lessons learnt and knowledge gained through involvement in this project and impart this to other water and wastewater systems and officials under their care. WSPs and W_2RAPs are living processes and need to be reviewed and refined to remain relevant to the current challenges facing WSAs.

WSAs also need to:

- Revitalise the importance of Risk Management in the provision of water and wastewater services to ensure personnel and funds are made available to address key risks identified through the WSPs, W_2RAPs and Action Plans.
- Advanced mechanisms to capture Water and Wastewater works statistical, capacities, flows and system processes as well as to perform trend analysis of water quality compliance data to support the early warning detection of risks.

There is still a need for further supporting of the WSP and W_2RAP cycles at District Municipalities and WRC and DST together with the Innovation Partnership for Rural Development programme can play a role in ensuring that the achievements of the project remain sustainable within the sector and contribute to the improved provision of water and sanitation services.

There is also a greater need to understand energy consumption and sludge management within municipalities. It was found that this was lacking in almost all of the selected WSAs.

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