The Silent Killer?
Wastewater Treatment Plants

A Turnaround Plan for waste water management in Mopani District

Despite serious challenges to waste water management in the district all is not lost if activities are guided by strategic planning & action

> *"Site inspections and audits in Ba-Phalaborwa indicated that the plants fail to meet required standards and hence pose a risk to human and environmental health."*

The Mopani District and Ba-Phalaborwa Local Municipalities are the mandated authorities to manage, operate and maintain three treatment plants: Lulekane, Phalaborwa and Namakgale. They were designed to treat a daily flow of up to 18 000 kilolitres of sewage. During ongoing engagements the municipal leadership expressed their concern and commitment to rectify the areas of non-compliance, providing that an informed list of shortcomings be confirmed which, if implemented, would remedy the situation. Out of this a Turnaround Plan was developed. The basics of this plan are presented in this brochure.

At AWARD, we recognise that the wastewater cycle is closely aligned with the status of the Olifants catchment. True to the values of the RESILIM-O vision, AWARD opted for a practical approach underpinned by a risk philosophy, which create sustainable solutions through a productive mix of science, technology, engineering, systems, procedures and institutional responsiveness and cohesion. Challenges in the delivery of safe wastewater services are not facing the Olifants catchment alone, but are a universal concern across the boundaries of the nine Provinces of South Africa. Any lesson or practical intervention that start to respond to the resilience of the Olifants catchment, will find appeal and replication elsewhere in the country.

AWARD's Approach

The AWARD team followed an approach that applied practical methodology combined with detailed desktop top evaluation, aimed at improving the most crucial aspects that impact on waste water management.

The study **"A Turnaround Plan for the Ba-Phalaborwa Wastewater Treatment Works"** revolved around two areas:

- Identification of the existing competency levels of Process Controllers and Supervisors, followed by targeted training and coaching to develop skill and knowledge in the identified areas.
- Correction of technical inadequacies, through the use of a Process Audit and Risk Assessment process.

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THE PROCESS FOR DEVELOPING A TURNAROUND PLAN

Skills Assessment	Process Audit	Risk Assessment	Turnaround Plan
Determine the competency levels of the Process Controllers and Supervisors – skill, knowledge, passion. Implement a targeted outcome-based training process to address gaps. This training comprise of theory + practical onsite work. Registration of staff on the national database and issue certificates	Physical and desktop audit of water quality, flow, infrastructure condition, staff requirements, plant design capacity, budget needs Stipulate interventions within short-, medium- and long-term time frame Highlight priorities that will fast-track compliance Model the plant's capability and limits	Integrated implementation plan with key priorities to address defaulting areas of compliance and best practice Communication of rationale and plan with stakeholders Buy-in and commitment by leadership to implement plan and drive Green Drop certification in 2018	Physical and desktop risk assessment of processes, budget, infrastructure, institutional and skills aspects that impact on plant performance Score and prioritise risks Setting of corrective measures, time frames, responsible persons, budget estimates 1 and 3-year turnaround budget estimates

CAPACITY BUILDING

Fifteen officials participated in capacity building, which included classroom and on-site training session. A Portfolio of Evidence was developed for each learner, containing the technical training curriculum, the assignments, and all evidence collected during the coaching period.

Officials improved their knowledge from 0-50% baseline score to above 60% over a period of three months. Interviews with the learners revealed that the course was seen as a good investment in terms of their time and career enhancement.

The learners are also of the opinion that they could attain a score of 80% with time. The most valuable parts of the training were found to be the measurement of flow, determination of chlorine levels, water quality testing and maintaining a logbook on a daily basis.The 15 staff members took great pride in being registered on the national database of the Department of Water and Sanitation as qualified Process Controllers and Supervisors. A Work Place Skills Plan was developed for further capacity development of the staff.

RISK MITIGATION

A high number of risks were identified which contributed to the treatment facilities not meeting effluent discharge standards on a consistent basis.

The highest risks were found in the following areas:

- Pump stations responsible for the conveyance of sewage to the treatment facilities,
- Disinfection of final effluent to kill of harmful micro-organisms before discharge to the rivers,
- Overall business processes and management of wastewater services inadequate.

The risks associated with the *Climate Change Mandate* varied between 20-30% of the total (high) risk profile and is summarised hereunder with more details in the full project report. ***This is the first recording of applying a climate change element as part of a risk management approach at a municipal works in South Africa.***

RISK #	HAZARD	RISK DESCRIPTION	ROOT CAUSE	RISK SCORE	CORRECTIVE MEASURE
67	Biogas	Biogas are not flared or reused and allowed to vent to the atmosphere from the anaerobic digesters	Operations	High risk 125	Flare methane gas or put measures in place to reuse the biogas
68	Disaster manage-ment plan	The lack of a Disaster Management Plan raises the vulnerability of people and assets to incidents	Management	100	Develop a Disaster Management Plan which foresee and plan ahead for disasters associated with climate change, including WWTW events
69	Effluent quality	Poor effluent quality discharge to the catchment result in algae bloom and water pollution with a high environmental footprint	Management	75	Rigorous monitoring of the plant performance on a daily to weekly basis, corrective action when non-compliance are measured
70	Inflow	Increased drought and extreme rain events will result in starvation or flooding of plant, which will impact on effluent quality	Design/ Planning	50	Monitor rain patterns over time and establish impact of low/high rainfall and drought on plant; Review the design of the plant to accommodate PF; Regulate a constant flow to the plant
71	Energy wise	No energy generation initiatives are observed	Management	Medium risk 50	All buildings can be provided with solar panels to provide regulator office lighting and to heat the hot water geysers; Electrical energy in the order of 60 kWh and 86 kWh heat energy can be produced via CHP
72	Energy wise	No energy saving initiatives are observed	Management	50	Automated control of all pump installations. Refurbishment of pump installations with high efficiency pumps
73	Disinfect-ion	Chlorine is used to disinfect the final effluent before release to the receiving water body. Cl2 is not a climate change friendly chemical.	Management	50	UV or ozone disinfection may be considered as a more climate friendly alternative to chlorine for disinfection

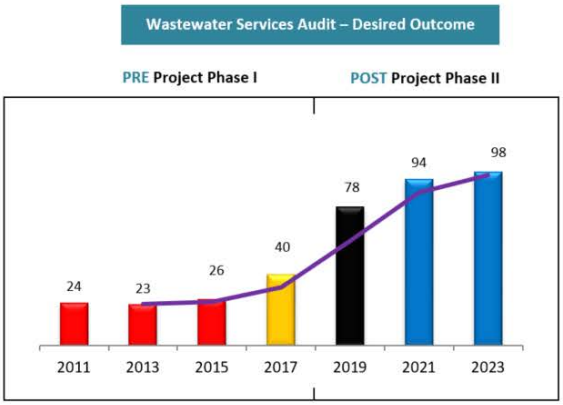
It is a meaningful exercise to identify the 'root cause' that essentially underpins each risk, as management can apply measures to correct these. The causes identified during this project included:

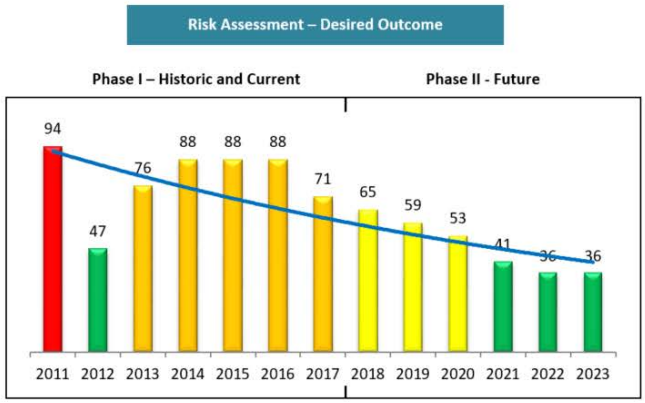
- Design/Planning
- Operations
- Scientific services
- Budget
- Management
- Maintenance & repairs
- Human Resources
- Procurement

More can be read about these in the full project report.

THE FUTURE

The success of this project to date and going forward is embodied in the saying *"to measure is to know"*. The municipalities of Mopani and Ba-Phalaborwa took an important first step to MEASURE and KNOW their status in a scientific manner, to identify the shortcomings, and to set a critical path for correction and turnaround.





Green Drop Certification is awarded by the Minister when a score of >90% is achieved, which represent "Excellence" for a wastewater treatment system. The Ba-Phalaborwa municipality started on a *low* Green Drop score and high Risk Ratio.The successful implementation of the Turnaround Plan will result in an *increased* Green Drop and *reduced* Risk score (see graphs above).

The municipalities face many challenges going forward and they realise that wastewater treatment plants remain a threat to the environment and to human health. However, the AWARD project presents an innovative approach coupled with a successful learning process that can be replicated with any municipality.

Upon project close-out, the teams were left with a great sense of achievement despite realising the need for further investment in wastewater infrastructure. There was a realisation, as aptly stated by Colin Powell: *"excellence in big things, is developed through habits in little matters. Excellence is not an exception, it is a prevailing attitude"*.

The project set out addressing the little things, whilst working towards the big things… so recognising the building blocks for achieving the excellence that a Green Drop Certification will bring.

The *Association for Water & Rural Development (AWARD)*

AWARD is a non-profit organisation specializing in participatory, research-based project implementation. Their work addresses issues of sustainability, inequity and poverty by building natural-resource management competence and supporting sustainable livelihoods. One of their current projects, supported by USAID, focuses on the Olifants River and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems to sustain livelihoods and resilient economic development in the catchment.

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About USAID RESILIM O

USAID: RESILIM-O focuses on the Olifants River Basin and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems that support livelihoods and resilient economic development in the catchment. The 5-year program, involving the South African and Mozambican portions of the Olifants catchment, is being implemented by the Association for Water and Rural Development (AWARD) and is funded by USAID Southern Africa.

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