Achieve Green Drop Status Using a Wastewater Risk Abatement Plan (W_2RAP) Approach

PRACTICAL HINTS & TIPS

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WIN-SA
WATER INFORMATION NETWORK
- SOUTH AFRICA -

SALGA
South African Local Government Association

Lessons from Drakenstein Local Municipality and Buffalo City Metropolitan Municipality

Dr Heidi Snyman, Director, Knowledge Management, of the WRC:

"… W_2RAP is about minimising risk and maximising resources"

WIN-SA question to Municipality:"What does Green Drop mean to your team?"

Drakenstein team: "The Green Drop has put us on a new level of motivation. Our plant managers now all want to be the best and they insist on the support and the resources that they need. Tanya nags Cedric to visit Saron more regularly; Shane at Pearl Valley does the same, because he wants his plant to be the best. Oom Robert never liked paper work, but the Green Drop assessments inspired him to cover his files, add pictures and make sure they are updated… the Green Drop created that kind of excitement."

Mkhuseli Ngogo, HR Manager Buffalo City:

"Wastewater treatment can be compared to the roadworthiness of a vehicle. A plant that is in a bad condition cannot deliver safe effluent that complies with Green Drop standards. To the Buffalo City team, assessing the roadworthiness of their plants on a continuous basis is the starting point and the end point. If you performance is not satisfactory, you have to intervene, and the end result of the intervention must be an improved performance. This is what our W_2RAP does for us as municipality"

Mkhuseli Ngogo, HR Manager of Buffalo City talking about wastewater treatment

Background

Municipalities in South Africa are gearing up to improve wastewater services management in pursuit of compliance and Green Drop Certification. Whilst many local authorities are working to overcome the day to day challenges involved in running a municipal wastewater business, others have already passed certain milestones and are acknowledged for their good management practice and drive towards wastewater excellence.

The SALGA/WIN-SA Hints & Tips capture the experience of these municipalities who are effectively using their W_2RAP (wastewater risk abatement plans) to achieve excellence by way of the internationally acclaimed Green Drop Certification programme. The objective of these Hints & Tips is to encourage municipalities to consider and replicate these practical and innovative suggestions that assisted the Drakenstein and Buffalo City municipalities to be recognised as wastewater achievers within the South African Water Sector.

The Hints & Tips presented below do not provide a comprehensive list of risks and responses, but aim to cover the lessons learnt and good practice observed from the two case studies that use risk management to improve their wastewater business. This Hints & Tips 2012 publication is the second issue and features good risk practice by Drakenstein and Buffalo City municipalities. WIN-SA can also be contacted to collect the first issue of the 2011 Hints & Tips that captured practical application by Tlokwe and Bitou municipalities. The document is a working report and we encourage readers and practitioners to submit suggestions and further Hints & Tips to WIN-SA for the 2013 issue.




The Green Drop Certification Programme

The Green Drop programme is a regulation programme driven by the Department of Water Affairs. It was designed to change behaviour and attitude towards wastewater services in the public sector and encourage positive action towards compliance and publication of performance results. It promotes incentive-based regulation and establishes **excellence as the benchmark** for wastewater services in South Africa. Not only has this 'proudly SA' programme become an effective vehicle for turnaround in wastewater service delivery in local government, it has also created a demand in the privately and other publicly owned wastewater owners. The latest introduction of risk abatement planning as a tool to identify and rectify high and critical risk areas within the business has been received with huge support. The Water Research Commission has published the **W_2RAP Guideline** in 2011 to assist this change in thinking and planning.

Participants receive Green Drop status when they achieve scores of 90% or higher, against a list of stringent assessment requirements. Green Drop scores are given **per collector and treatment system**, complemented by CRR (Cumulative Risk Ratio) scores which are given **per treatment system**. The following table summarises the Green Drop criteria for 2012/13. This WIN-SA lesson will focus on the good practice that supports CRITERIA 5 – Wastewater Quality Risk Management, which focus on risk management.

KPA	Sub-requirement	Weight
1	Process Control, Maintenance and Management Skill	10%
2	Wastewater Monitoring Programme Efficacy	15%
3	Submission of Wastewater Quality Results	5%
4	Effluent quality compliance	30%
5	Wastewater Quality Risk Management	15%
6	Bylaws (Local Regulation)	5%
7	Wastewater Treatment Capacity	5%
8	Wastewater Asset Management	15%
		100%
	Bonuses	+17% max
	Penalties	-5% of total

Hints and Tips

In the sections that follow, WIN-SA provides you with Hints & Tips aligned to Criteria 5 of the 2012/13 Green Drop requirements. This criteria aim to assess the practices that the Drakenstein and Buffalo City municipalities follow in consideration of the following question:

Risk Abatement...

What (the incident) could go wrong (the risk) in a wastewater system - what is the probability (likelihood) that this incident will occur - what are the results (the consequence) of the incident - what do we have in place to prevent 'the incident' from occurring (contingency measure or response plan) – and if the incident does happen, how do we deal with it (emergency procedures)?

Tip 1: Manage wastewater treatment as the first critical barrier in a multi-barrier system towards ensuring public and environmental health and safe drinking water

- It helps to take a multi-barrier approach to risk management. One critical failure at the pump station will lead to a failure at the inlet works, which, in turn, will lead to a failure at the settling tanks, and so on.
- Identify the critical control points along this value chain and prioritise resources to those first. Buffalo City identified their disinfection and activated sludge reactor as their 'weak' points (risks) and used their W_2RAP to access funds and rectified these two critical points.

Tip 2: Write up a W_2RAP through a team effort

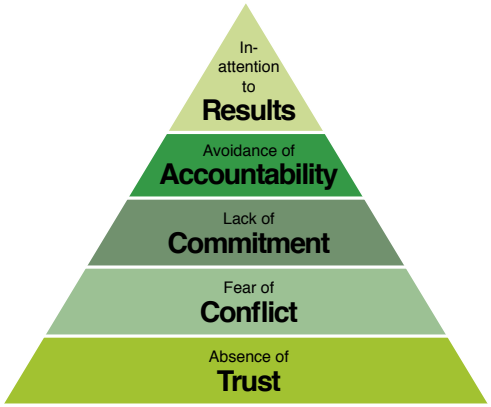
- Risk abatement is a process – however, it helps to document this process, findings and actions in the form of a Wastewater Risk Abatement Plan (W_2RAP) to ensure focus and proper planning. Both good practice municipalities have W_2RAPs in place as 'living actionable workplans' and use it to monitor their risk status on a regular basis.

- Involve the councillors as part of the W_2RAP process, as it assists them to understand the risks and actions required in the municipal wastewater environment. Drakenstein's Infrastructure Councillor is fully conversed with the W_2RAP and uses this plan to support adequate financial resources to wastewater projects.
- The Drakenstein team uses the mandatory requirement for a W_2RAP positively as a management tool to work towards achieving Green Drops for all six plants. Within this framework, risk abatement becomes a PROCESS to bring focus and priorities to the decision-making table. Everyone understands the concept of 'risk', especially the financial decision-makers.

"As resources are scarce, we always ask two questions before any expenditure: 'Will this save money for Council?' and 'Will this be the best use of public money?"

Tip 3: Acknowledge 'people' as a risk, but develop them as a valuable resource

- People are at the centre of a well managed and operated treatment facility. The potential is there for mechanical failure, process failure, structural failure, but what about people failures? Typical people failures are illustrated in the triangle-diagram.
- Assign clear responsibilities and duties to each team member, everyone need to understand what is expected of them, by when – to contribute to team success.
- A SWOT analysis assists to identify the risks and opportunities in the team, and to plan towards building the team's strengths and supporting weaknesses.



- A mentor is assigned to people who start to climb the expertise ladder. "The value of an inspired and knowledgeable mentor cannot be measured."
- A career path is important, with clear goals and timelines stated. This allows wastewater practitioners to see their work as a 'career', not just a job.

Courses that have helped to build wastewater careers:

- Transportation of Dangerous Goods - Sludge, Chlorine, Sewage, etc.
- NQF Level 2 (Water Academy) - Process control
- Safe Handling of Chlorine (Chlorchem) - The disinfection process
- First Aid Course (Medical Events and Training Services) - Occupational Health Safety Act requirement
- 6M Municipal Training (In-house Training) - Municipal Processes
- Free to Grow (In-house Training) - Management Tools, Self-Development, Communication, Handling Conflict management, Human Relations and Assertiveness
- Process Controllers' Training Day (WISA)
- Health and Safety Representative Training (TechniLaw) - OHS Act Requirement)
- Training Course Wastewater Treatment Management (CPUT) - Understanding Processes and reasons for Actions
- Entry Level Adroit Operations Course (SSE) -Telemetry
- NQF Level 3: Water and Wastewater practice
- N3: Water and Wastewater practice
- Computer Training

Tip 4: Put practical checklists and monitoring systems in place to measure the effectiveness of the W_2RAP

Flow monitoring is critical to any successful plant operation. Buffalo City identified the risk of high stormwater ingress and excessive water leaks to the sewer system, as it artificially deplete the plant's capacity and dilute the raw sewage composition. The flow monitoring regime is being expanded to include a comprehensive volumetric monitoring at the plant's head of works:

- average dry weather flow
- rainfall events (in mm)
- average wet weather flow
- peak wet weather flow
- night flows at around 2h00
- COD during dry weather conditions = 250 – 350 mg/l
- COD during dry weather conditions = >150 mg/l
- Daily record keeping of all flows and corresponding quality (COD) data

- Monitoring of both uptime and downtime of equipment gives a good indication of how well the maintenance team is functioning.
- Daily check lists for pumping stations and generators, and a monthly preventative maintenance plan for service pumps are useful tools to ensure discipline and routine in the daily operation and maintenance of the plant.
- IT access and use of information systems assist to capture and track compliance and analyse trends.

James Maher says: "We get showered with data. I call it A4-size snowflakes. What do you do with all this? You can put it in the rubbish bin or you can file it nicely and put it away in a cupboard and do nothing further with it, which is worse than putting it in the rubbish bin. Or you can make an effective tool that aids your operating staff, your planning staff and your senior management. It must be concise; it must be up to date; it must be current."

Tip 5: Ensure that operational functions are supported by maintenance readiness

- Ensure that stock and spares are always available to minimise downtime of equipment. It helps to standardise on the type of motors, pumps, flow meters, etc, to ensure that a standard set of spares can be used or equipment parts can be swapped.
- "Cheap parts or materials can turn out to be an expensive mistake. You have to be aware of incorrect sizing, substandard material and under-specified equipment when you order. I need a bearing that will last for five years; we only buy a specific type of German bearing, which we know will last." The municipality has also realised the value of standardising equipment.
- Electricity interruptions or changes in Quality of Supply can be a major risk to equipment and plant compliance. A standby generator is in place to mitigate the risk and it is tested weekly to ensure reliable start-up when required.
- The use of external electrical-maintenance contractor inspections offers high value to the maintenance and repairs in-house, as it serves as a mini-audit.

Tip 6: Security is a critical risk and needs appropriate mitigation measures

- (Appropriate) security to a plant is non-negotiable.
- A plant that offers housing for the plant superintendent and/or Process Controller carries a huge benefit.
- All successful municipalities value their scientific and laboratory services above all, and invest in upgrading lab equipment regularly.

Tip 7: Invest in scientific and laboratory services as it will halve most risks immediately

- Mini-labs are convenient stations where on-site analysis can be done on the plant by the Process Controller, with the benefit of having the results available on the same day. Such tests would include pH, nitrates, ammonia, ortho-phosphate and MLSS, at a cost of R12 000 per kit. Settling tests and Dissolved Oxygen tests are rapid and valuable operational tests to ensure compliance of the final effluent.

Tip 8: Involvement in technical activities outside the municipality raises risk awareness and problem solving in-house

- Excellence breeds excellence. A successful wastewater team is marked by their involvement and leadership in additional and often, regional, initiatives. For example, Drakenstein hosts various Western Cape Process controller training days, lab workshops, Women for Water, and is active in Netherlands partnerships.

Tip 9: Asking questions assists to identify risk and provide solutions to abate risks on all levels

- Management should encourage questions and discussion and answers from their staff. The “why’s of wastewater” are asked and answered every time when the plant supervisors walk through the plant with their teams. Refer to the “Why’s of Wastewater” table for extracts of questions and answers from the WIN-SA workshops.

Tip 10: Aim high and use targets to measure achievement

- Teams that AIM for 100% compliance are winners even if they fail and only meet 95% compliance! But teams that aim for 90% compliance and then end up with 85%, will not achieve Green Drops.

Tip 11: Know who to contact if a risk event occurs and what the procedures are

- To avoid potential catastrophic failure on the six plants, the Drakenstein wastewater team continually assesses and manages the risks and hazards and manage them appropriately. There is always the risk of a mechanical, structural or process failure within the plant. They use the Green Drop stipulation to have an Incident Response Management Protocol to ensure that risks are dealt with before they are in the red.

Tip 12: Planning is a predominant part of risk mitigation and all plans rely on good information

- A winning municipality KNOWS their infrastructure size and type of technology for both sewage and sludge treatment technologies.
- The closer that a plant operates to its design capacity, the better performance can be expected. A plant that receives 80-90% in relation to its design capacity, should function well.
- As soon as a plant approaches 70% of its design specification, planning for upgrade should commence.
- Buffalo City MM ensures that they always have projects in hand that can be implemented without delay, once funding can be secured. They appoint contractors on a fixed term (3 years plus the possibility of a further 2 year extension). Only contractors with a solid track record within their field of expertise are used. Furthermore, they allow contracts to be versatile enough to allow for ‘generic’ work that is part of most projects.
- The municipality prides themselves in executing the bulk of maintenance work in-house. Approximately 25% of the total maintenance function is outsourced, which ranges from full outsourcing for telemetry and limited outsourcing for electrical and mechanical work.

Construction work at Buffalo Plant

- To assess a plant on each of these performance areas, you have to:
  - Know the plant and the sewer network so that it can be described and presented in diagrams;
  - Know practices so that you can evaluate them against the Green Drop standards to determine the gaps in operational, maintenance and management aspects;
  - Look at staff capacity and the use of capacity;
  - Put a metric or a value to risks to form a quantifiable basis from where to reduce the risk (to measure is to know!); and
  - Use the same assessment unit (%) to score and compare units in the production chain so that you can identify the highest risk.

Tip 13: Monitoring and reporting is key in successful W_2RAP implementation

- Good monitoring and reporting practice in Buffalo City include the following practical tips:
  - Always track project implementation against measurable facts and figures, such as time, Rand and the percentage items completed.
  - Keep reporting simple, do not complicate it with an overload of technical information.
  - Focus on results, do not divert by over-reporting.
  - Decide upfront with the project funding agent, in this case the regional official responsible for the contract, how the reporting format should look.
  - Link the project (construction) to ongoing effluent analysis to ensure that the new upgraded facility is directly linked to the proof that the project is making a difference: 'compliance of final effluent" (which is also Green Drop Criteria 5!).
- Progress reports must be clearly written and easy to understand and to update, even for a non technical reader. Provide photos as supporting evidence, as it speaks 1000 words. Dropbox can be used to distribute electronic copies of large files.

Tip 14: Use the W_2RAP to bridge your project's funding gap

- The Department of Water Affairs ACIP fund follows the same value chain as the W_2RAP. Both processes advocate that you should always have a BASELINE to work from and to report against. This allows for reporting against a clear metric or unit of measurement and allows for credible tracking of progress and improvement. Buffalo City found that if a municipality has a good W_2RAP in place, it is no hassle to complete the ACIP Business Plan and obtain funding.

Tip 15: Identify the risks outside the municipal fence and manage it with sensitivity but firmness

- Industrial effluent poses a significant risk factor to municipalities that receive non-domestic effluent as well. Drakenstein's approach is to focus on the people behind the effluent and to get them to cooperate and regulate themselves. It comprises a few basic steps:
  - know your customers;
  - learn from best practice in other municipalities;
  - talk directly to the CEO; and
  - seek solutions instead of pointing fingers.
- If industrial activity is apparent, identify the top 10 or 50 highest water users as it is likely that they will also be the highest industrial effluent producers. This is to be followed by visits to each industry/factory, analysis of the effluent, measure the flow, inspect the permits or bylaw conditions and log them on the municipal database.
- Often, municipalities implement an incentive-based tariff with a window period of a year. This provides a company a year to develop a strategic plan that the Board and the CEO must sign. The plan could be as follows:
  - a detailed description of the quantity and composition of the effluent at each fall out point;
  - a monthly implementation plan with specific targets, for example

pH and CODs, that we can monitor. If the plan does not have the desired effect within three months, we will charge penalties.

- A storm water management plan; and
- A waste reclaiming plan.

Tip 16: Perception management is important – be mindful of how we use sewage 'words'

- Perception is a huge issue in wastewater business. Successful wastewater professionals TALK about their successes and pleasure in work, often starting with their own family. Changing perception is part of elevating the image of wastewater. It is not about 'sewage' – it is about the wonder world of nitrates, pH, wonder bugs and science.
- Changing the face of wastewater is not just talked about, but 'done' at the treatment plants. Initiatives include a state of the art boardroom with library and computer centre, stylish finishing, a bird look out right next to the plant, beautiful gardens and landscaping.
- Communication is important: "...do not shy away from angry farmers, embrace the issues, seek solutions and report back regularly".

Tip 17: Use specialists for specialist work!

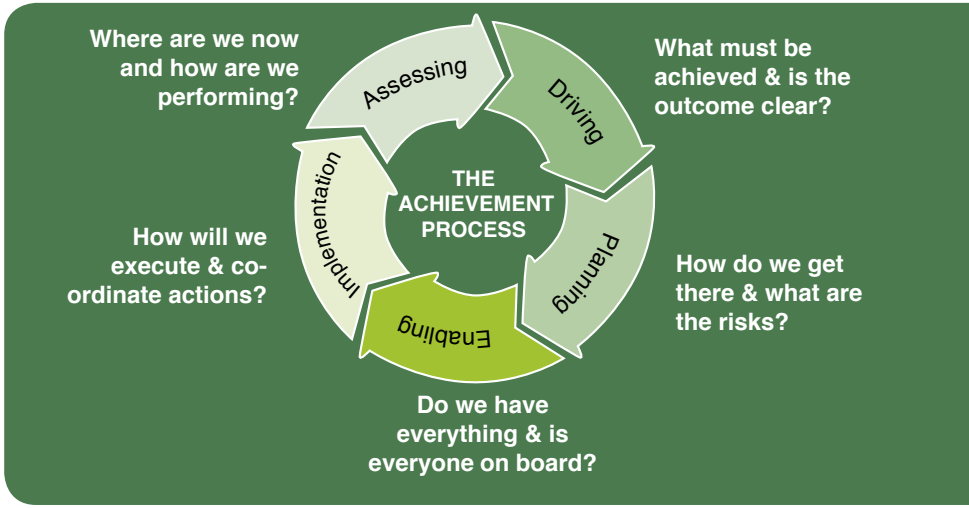
- Specialists are value adding resources in such cases where the expertise is not available in-house. W_2RAP development is best served when done in-house and facilitated by a specialist.

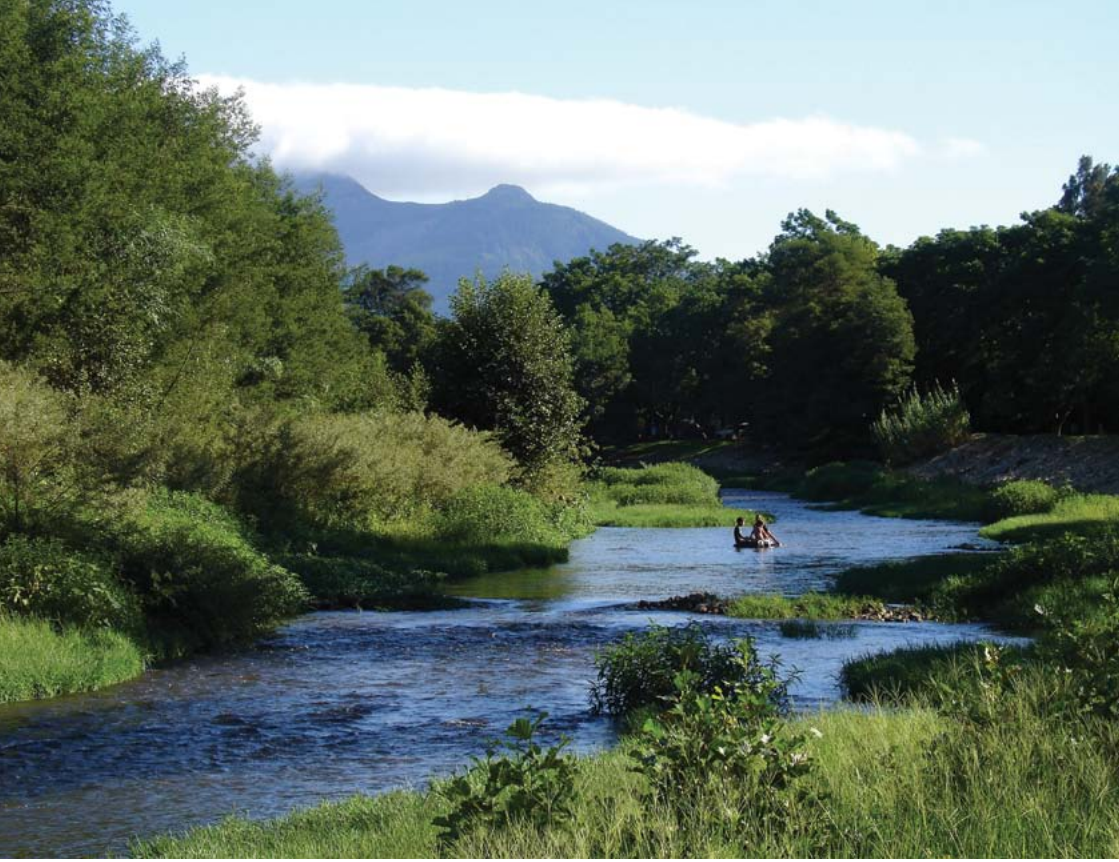
Specialists provide meaningful contributions with some of the following:

- To conduct an independent Green Drop audit every quarter and to suggest actions to improve compliance. In this way, the validation phase of the W_2RAP is also adhered to.
- External laboratories assist with monitoring effluent quality. They also do the quality assurance of the laboratory and assist with recommended actions.
- To do a safety audit and an integrated management plan for industrial effluent.
- Universities are well-equipped to perform a Human Capital Development audit which will inform the municipality on career pathing and training priorities for its staff. This initiative will address risks associated with staff.
- To compile a stormwater management plan to identify all possible areas where surcharges may occur to quantify and prioritise problem points.
- To monitor other effluent discharges to the receiving water resource.

Tip 18: Use Green Drop Certification to set goals, improve operations and bring focus

- Ronald Brown explains: "A year ago, we felt that everybody was operating in their own cocoons, although we share a common goal. So we came together and decided that, in five years' time every municipality in the Western Cape must have a Blue Drop and a Green Drop. And how are we going to achieve this? We have to work together".
- The wastewater team of Buffalo City MM developed a five cycled roadmap, which links assessment of performance, risk-abatement and an ACIP capital injection for infrastructure upgrading to Green Drop status.





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