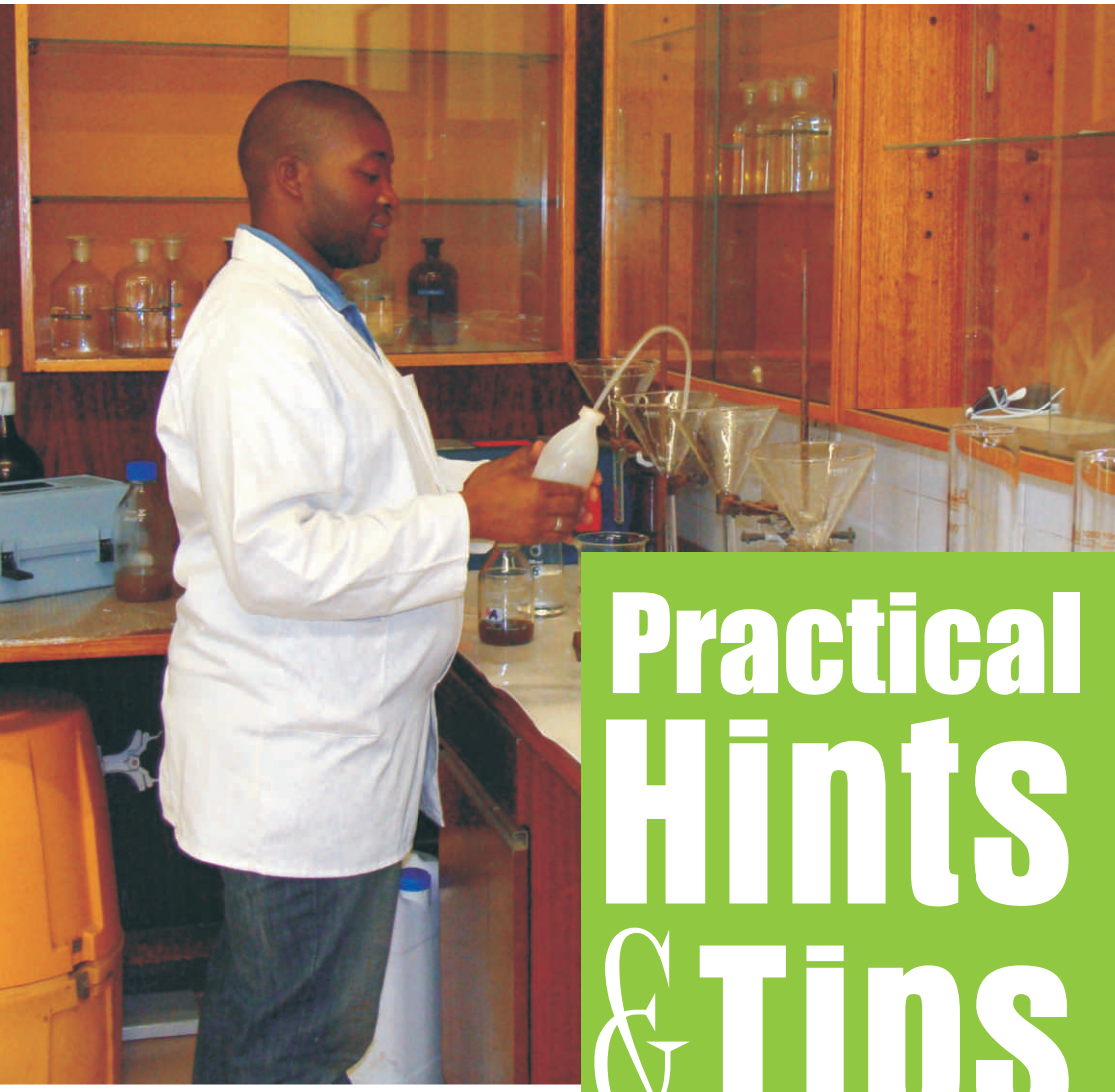
Achieve Green Drop Status



Practical Hints & Tips

WIN-SA
WATER INFORMATION NETWORK
- SOUTH AFRICA -

SALGA
South African Local Government Association

"A municipality's most important service is:
number one - water and number two - sanitation.
You can still drive on a road with potholes, but if you drink
toxic water, you will die."
Ben Nell (Tlokwe LM)

Municipalities in South Africa face many challenges in providing effective water services to consumers, especially with regard to the management of wastewater treatment plants. Municipalities can overcome challenges by learning from each other, by exchanging ideas and through practical lessons.

The SALGA/Win-SA hints and tips on achieving Green Drop status captures the experiences of smaller municipalities who are effectively managing their wastewater treatment plants. The objective of these hints and tips is to encourage municipalities to consider these practical and innovative suggestions that could assist them to run their wastewater business efficiently.

The hints and tips presented below does not provide a comprehensive list of tips and hints, it only covers what has been learned and observed from Tlokwe and Bitou municipalities as part of documenting good practices in wastewater by the two municipalities. It further covers the tips according to DWA, SALGA and lessons learned from the Drakenstein municipality (presented during the Small WWTWs Conference East London). The document is a working document and we encourage you to submit your suggested tips and hints to WIN-SA.

What is the Green Drop Certification Programme?

(DWA, 2010)

The Green Drop certification programme was designed to serve as stimulus for change; a **catalyst** to establish a **water-shed** in the water sector regarding the management of wastewater services. The aim of the Green Drop programme is to create a **paradigm shift** within the manner in which wastewater operations, management and regulation is being approached.

It promotes incentive-based regulation; establishing **excellence as the benchmark** for wastewater services.

The criteria focus on the **effective management** of wastewater services instead of the continuation of end-point monitoring and subsequent reactive operations.

2 Green Drop criteria

Municipalities receive Green Drop status when they achieve scores of 90%, or higher, against the stringent Green drop assessment requirements. Green Drop scores are given per individual wastewater system within the municipal area for the following:

1. Process control, maintenance and management skills;
2. Wastewater quality monitoring;
3. Credibility of wastewater sampling and analysis;
4. Submission of wastewater quality results;
5. Wastewater quality compliance;
6. Management of wastewater quality failures;
7. Storm-water and water demand management;
8. By-laws;
9. The capacity of the facility to reticulate and treat wastewater;
10. Publication of wastewater quality performance; and
11. Wastewater asset management.

3 Hints and tips

In the sections that follow, we give you hints and tips linked to each of the eleven Green Drop criteria.

3.1 Process Control, Maintenance and Management Skill

The first set of criteria relates to registering the wastewater treatment plant and making sure that the necessary management, technical and maintenance skills and procedures are in place.

A winning management team:

- Is technically strong, committed and solution-driven - proactive rather than reactive.
- Takes regular decisions: what has to be done, who takes responsibility and by when must it be completed.

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1 It is important to take regular samples

2 Stormwater infiltration

- Uses opportunities to increase knowledge and to apply what they have learnt.
- Outsources when they do not have the internal capacity, but they retain control and manage service providers effectively.
- Informs and involves the relevant Councillor and the MM. This improves cooperation at Council and senior management level.

Skills development is a continuous process:

- "You need people who know what they are doing".
- Put an ongoing mentoring programme in place to retain or re-gain institutional memory.
- It is important that young laboratory assistants and process controllers are able to understand and interpret laboratory results and know why certain corrective actions are taken.
- Take note of the good training institutions and trainers.
- Outsource some functions if necessary.
- Ongoing studies, even at postgraduate level, are complementary – it must not divert staff from their primary duties.

Successful wastewater treatment teams are supported by Council, the Municipal Manager, administrative systems and an informed community.

How to form strong, supportive partnerships:

- Get Council and the MM behind you in the quest for a Green Drop.
- Inform Council and the MM of the importance of water and wastewater.
- **Make water and sanitation important in your municipality.**
- Arrange an annual field trip to pump stations and treatment plants for the CFO, MM, procurement officer and Sanitation Portfolio Committee.
- Arrange this trip within 4 months after new Councillors have taken office to get a head start!
- Involve Councillor/MM in activities, e.g. in a schools programme or a training workshop for process controllers.
- Collect relevant media clippings and distribute to Council and the MM.
- Ask a knowledgeable person from the community to stand for Council.

Laboratory assistants at Tlokwe LM

Successful smaller municipalities **integrate water and wastewater management**, but ring-fence the budgets and expenditure to know the cost of:

- Water treatment
- Water distribution
- Water losses
- Sewer collection
- Sewer treatment
- Sludge handling

This is the first step to establish transparent tariffs, which reflect costs.

For effective operation and maintenance:

- Use scientific tests to support O & M adjustments.
- Hold weekly plant, lab and management meetings to discuss failures and plan remediation.
- Do daily inspections.
- Put a preventative maintenance programme for plant equipment in place.
- Standardise pumps and motors to simplify operation and maintenance.
- Improve your turn around times for repairs.

3.2 Wastewater Treatment Facility Capacity

It is critical to have the appropriate technology for <u>your municipality:</u>

- It is important to choose wastewater treatment technology that suits the unique needs of the municipality. State your circumstances and the key drivers when briefing consulting engineers in this regard.
- Do not allow service providers to dictate technology to you. Assess whether the community can afford it. Sophisticated technology requires advanced skills. Ask yourself, for example: Do we have the skills and budget to maintain and operate the technology? Can it meet the legal limits for discharge?
- Build flexibility into the design of your wastewater treatment facility.
- Avoid crisis management. Plan ahead so that, if there is a crisis, the plant is flexible enough to handle it. Also, make sure systems and procedures are in place to support crisis-based decisions.

New equipment and technology is important

Good planning helps to achieve goals!

3.3 Wastewater Asset Management

Good planning is the basis of efficient wastewater asset management:

- Assess all cost aspects of different technology options, including lifespan operation and maintenance costs.
- Get fixed quotations from NCP for chlorine delivery over 12 months – then you do not have to battle with procurement.
- Factor in the increase in energy cost and plan in time to make your plant more energy effective.
- Plan for spare capacity.
- Appoint a PSP to investigate alternative funding sources in an effort to augment capital budget.
- Eliminate stormwater ingress and potable water losses to the sewer system. It depletes the available capacity of your wastewater treatment facility!

Procurement is a key ingredient of good planning:

- Only use suppliers with a good track record.
- Make sure that suppliers are registered on the municipality's database.
- Get a sole supplier letter if there is only one supplier of a particular product.

Effective wastewater management needs the support of reliable suppliers, procured correctly and paid within 30 days:

- Procure suppliers that consistently deliver high quality work.
- Insist on a Materials Safety Data Sheet (MSDS) from chemical suppliers to verify the quality of the goods.
- Procure suppliers that are willing to deliver/work after hours and on public holidays, make sure they are available on standby at night, over weekends and during public holidays.
- Pay suppliers within 30 days.
- Talk to your suppliers. Tell them why you need a part urgently. Tell them about the consequences, for instance a polluted river, dead fish and crocodiles, if you don't get that part **today**.

- Do preventative maintenance as well, for instance greasing bearings, checking the oil in the gearboxes and checking for leaks.
- Get a supplier who is prepared to lend a pump while yours is being repaired.

3.4 Wastewater quality monitoring

Four sets of Green Drop criteria relate to wastewater quality:

- Wastewater Quality Monitoring Programme
- Wastewater Sample Analysis (credibility)
- Submission of Wastewater Quality Results
- Wastewater Quality Compliance

Effective municipalities have several practical suggestions on how to achieve the high standards of wastewater quality that the Green Drop criteria require.

How to achieve and maintain good effluent quality:

- Establish your own laboratory, even if it is small and limited.
- Take regular samples and do the necessary tests.
- Basic on-site analysis is a MUST and does not require a sophisticated laboratory. Include DO, MLSS, sludge age, SVI and free chlorine analysis in your list.
- It is VERY IMPORTANT to measure flow daily.
- "We do not wait; we do not delay."Don't postpone, don't play catch up. Take immediate action! And always have spares for critical parts!
- Push yourself to become better – driven and committed people are the key to an effective wastewater facility.

3.5 Bylaws

By-laws are necessery to support the control of industrial wastewater:

- Make sure that you have the necessary by-laws in place to control industrial wastewater and to enforce charges.
- Communicate with industries in your municipalities, explain the impact of industrial wastewater on wastewater infrastructure and get their cooperation.
- Require industries to install flow meters on industrial effluent lines.
- Take photos of industrial discharges and spillage events and document accurately.
- The tariff must be proportionate to the potential impact of the constituent on the treatment process – e.g. a high COD of 7000 mg/l must carry an equally high tariff.
- Every industry must have a schedule of discharges, consisting of flow and quality.

3.6 Wastewater Quality Failures Response Management

Failures will occur, but successful municipalities have protocols in place for each possible failure, which enable them to respond quickly and effectively.

Below is an example of such a protocol.

Problem Solving

Problem	Causes	Solution
High Chemical Oxygen Demand (COD) or Suspended Solids	• Industrial discharges • Over aeration on reactor (pin flock) • High Diluted Sludge Volume Index (DSVI) >120 in reactor • Flux failure in clarifier	• Identify industry and address at source. • Check Dissolved Oxygen (DO) probe calibration. • Check DO control automation. • Adjust DO range on the Supervisory Control and Data Acquisition system (SCADA). • Check Mixed Liquor Suspended Solids (MLSS) for temperature. • Check upward velocity for MLSS and DSVI. • Check hydraulic load on clarifiers.
High ammonia	• Under aeration • Low MLSS for temperature in reactor • Industrial discharge • Loss of nitrifiers through high MLSS wasting rate • Recycles from digesters, storage dams, etc	• Adjust settings for DO control. • Increase MLSS to suit temperature. • Check MLSS wasting rate.
High nitrate	• High s-recycle ratio • Insufficient particulates in feed • Over-aeration • Dissolved oxygen in anoxic zones • Incorrect nitrate recycle rate (a-recycle)	• Set s-recycle ratio (0.6 – 0.8). • Increase particulates in feed. • Control DO limits. • Remove free oxygen in anoxic zone. • Set a-recycle and r-recycle rates. • Increase MLSS.
High ortho-phosphates	• Free or bound oxygen in anaerobic zone • High NO_3 in pre- and anoxic zones • Under or over aeration • Insufficient particulates in feed • Recycles from digesters, storage dams, dewatering	• Ensure true anaerobic and anoxic conditions. • Set required s-, a- and r-recycle rates. • Set correct DO limits. • Increase particulates in feed. • Increase Volatile Fatty Acids (VFA) in feed. • Check ferric chloride dosing rate.
High E coli or faecal coliforms	• Short retention time • Low dosing rates for high flow • Blocked dosing system • High solids in final effluent channel	• Reduce flow to contact channel • Increase dosing rates • Install proportional dosing • Check system for blockages • Clean contact channel weekly

3.7 Wastewater Quality Failures Response Management & Stormwater and Water Demand Management

Successful municipalities reduce their risk and invest in a Wastewater Risk Abatement Plan.

RISK	CONTROL MEASURE
CATCHMENT	
Upstream mining has a negative impact on the	Monthly meetings with mines.
Heavy rainfall floods the sewer reticulation and	Clean stormwater system, seal sewer manholes
Spillage may occur upstream with high volumes of raw sewerage that flow down in the catchment	Monitor water in catchment and communicate
Highly cultivated area with small scale farming.	Add additional flocculants when necessary.
Industrial waste from factories, abattoirs, mines and food producers can lead to high volumes of CODs that may affect the wastewater plant.	Weekly checks of flows and CODs.
In dry weather conditions, the river can become stagnant without any dilution. This has an effect on the final effluent. High salt loads in the river have a	Communicate with DWA for the outlet of water
Live stock, aquatic species, fertilisers and pesticides may have a negative impact on water quality.	Communicate with Agricultural Forum to limit
SEWER RETICULATION	
Vandalism.	Public participation. Replace cast iron with
Stormwater infiltration.	Replacement programme for manhole chambers.
Pump station failures.	Daily checks of pumps and power supply.
SEWER TREATMENT WORKS	
Power failures.	Standby generators to be purchased.
Mechanical failures or process failures.	Daily, weekly and monthly checks on pumps and
Flooding: stormwater ingress.	Overflow to maturation ponds to prevent
Storage in sludge dams: contamination of ground	Possible composting in the near future.
Chlorine overdosing: damage to aquatic species.	Install inline chlorine analysers with alarm settings.

3.8 Publication of Waste Water Management Performance

According to this criterion, municipalities must publish their performance in various communication mechanisms to reach a wider audience. This encourages an informed and involved community, which in turn will lead to the support for wastewater issues in Council and sufficient budget to operate and maintain plants efficiently.

How to grow and develop an informed and involved community:

- Hold a water quality Lekgotla/Imbizo. Invite the community. Share your results with the community. **They have the right to know**. Share with each other your concerns and challenges. Be transparant.
- Use the expertise available in the community to assist in solving problems.
- Offer to give talks to environmental groups or rate payers' associations.
- Use schools' programmes and school visits to nurture an informed and involved future generation.
- Use the local media to spread the word and educate the community.
- Use the ward structure to spread the word and educate the community about wastewater treatment.
- Environmental groups strengthen awareness of the importance of wastewater management in a municipality. Embrace them as allies.
- Green Drop status is a significant achievement. Market your town and municipality when you achieve a Green Drop

What others have to say about the Green Drop process

This section summarises views and perspectives from the Bitou and Tlokwe Local Municipalities:

3.9 Tlokwe

"Blue Drop and Green Drop closed the gap between health and engineering in our organisation."
"Green Drop forced stronger cooperation between units in the municipality."

Learners from the Wittedrift Primary School in Plettenberg Bay test water from the Rondebos River 1

Reading material is always supported by practical exercises 2


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“With the first assessment in 2009, we had things in place, but it was not documented, it was in our heads. With the second assessment in 2010, we had our systems in place, everything was doumented and we were better prepared. For the third assessment, we have a risk- based approach in place and a fully developed Wastewater Risk Abatement Plan."

The asset register and the Risk Abatement Plan forced us to document our assets and processes accurately. "The Green Drop assessments resulted in a big improvement in our administrative and documentation processes," concludes Ben Nell.

These documents empower thems to present the case "in black and white" to the Council and gives the team much stronger leverage for funding. It also creates an institutional memory of wastewater collection and treatment in Tlokwe.

In the recent past, wastewater management was a much neglected profession. The Green Drop programme has given new importance, awareness and greater status to wastewater treatment and wastewater management.

This might generate more funds from government and different institutions for wastewater collection and treatment, including repairs and maintenance.

3.10 Bitou

"We have had a laboratory for years. Because we are such a popular holiday destination, we have had to make sure that everything regarding wastewater is in place and that we comply with regulation. This gave us an edge, because we already complied with many of the requirements of the Green Drop", says Pikkie Lombard.

"It is a big job to get all the paperwork in order, but if the exercise is over, all the documentation is in place", says Ronald Tarentaal. Now they can focus on improving their performance.

Pikkie Lombard believes the Green Drop programme has a number of advantages: "The Green Drop programme is one of Water Affairs' greatest initiatives ever. It gave new status to the profession and people are proud to be a part of this important work.

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1 Etienne de Waal in the Bitou laboratory

2 Plettenberg Bay is a popular holiday destination

We feel now that we are not just a number, but that we are recognised for the work we do and that we mean something or can contibute towards making our community better."

Ronald Tarentaal agrees: "The Green Drop has also encouraged municipal support – if we don't do well, it reflects badly on the municipality – so Council and the administration gives us the support we need to achieve Green Drop status. Green Drop has created a competitive environment: We all want to improve and become as good as those municipalities who have Green Drop status".

Bitou would, however, like to see more control with regard to certain aspects of the programme such as:

- Certification – workers should be classified according to their knowledge and skills. "You cannot be certified as Class III if you cannot do the work expected of a Class III Process Controller."
- Knowledge and skills assessment should include plant managers as well. This is the single most critical position which makes or breaks an effective wastewater service!
- Laboratory analysis – very few municipalities are up to date in this respect.
- A performance assessment that spans 12 months (currently, municipalities are assessed and scored on what they have done during the month before assessment, even if they had none of the requirements in place prior to that month).
- "Each year there are also additional requirements, for example, they want the documentation for the water quality tests, workers need to attend training, etc and, if you don't comply, you lose marks. This year there was no training available for wastewater management – so we lost marks, even though it was through no fault of our own ", says Ettiene de Waal.

To the Bitou team, Green Drop is a credible programme and they realise that it will take hard work and dedication to maintain Green Drop status and continuously improve.

3.11 DWA

1 Preparation for the assessment. However preparation cannot start days/weeks before assessment; WSi should continuously be prepared.Those who obtained best scores are those who were best prepared.

Bitou team: Pikkie Lombard, Manager: Water Quality Control and Ronald Tarentaal, the Superintendent: Water and Sewer

Process controllers receive practical training on the plant

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2 Monitor and Manage Effluent Quality compliance & Treatment efficacy throughout the year.

3 Provide proof of compliance with set requirements.

4 Ensure adequate Municipal/WSP representation during assessments.

5 An internal Green Drop Committee was found to be best practice.

6 Aim realistically; adopt a pragmatic and incremental approach to reach the Green Drop goals and Document progress.

7 Adopt a Risk Reductionist Approach and invest in a W2RAP (Wastewater Risk Abatement Planning) process

3.12 SALGA

1 Seek help from others that have achieved the green and blue drop status.

2 Contact SALGA for assistance – SALGA has a technical team that will give you strategic advice and guidance

3 Take your MMC for infrastructure to assessment of the blue and green drop

4 Prepare a report to Council on the shortfalls and indicate the implication – SALGA will support such a report

5 Regularly benchmark your municipality against other and inform Council on the status of your municipality in relations to your peers.

The Bitou LM team

The control panel at Gansvlei

For your notes

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