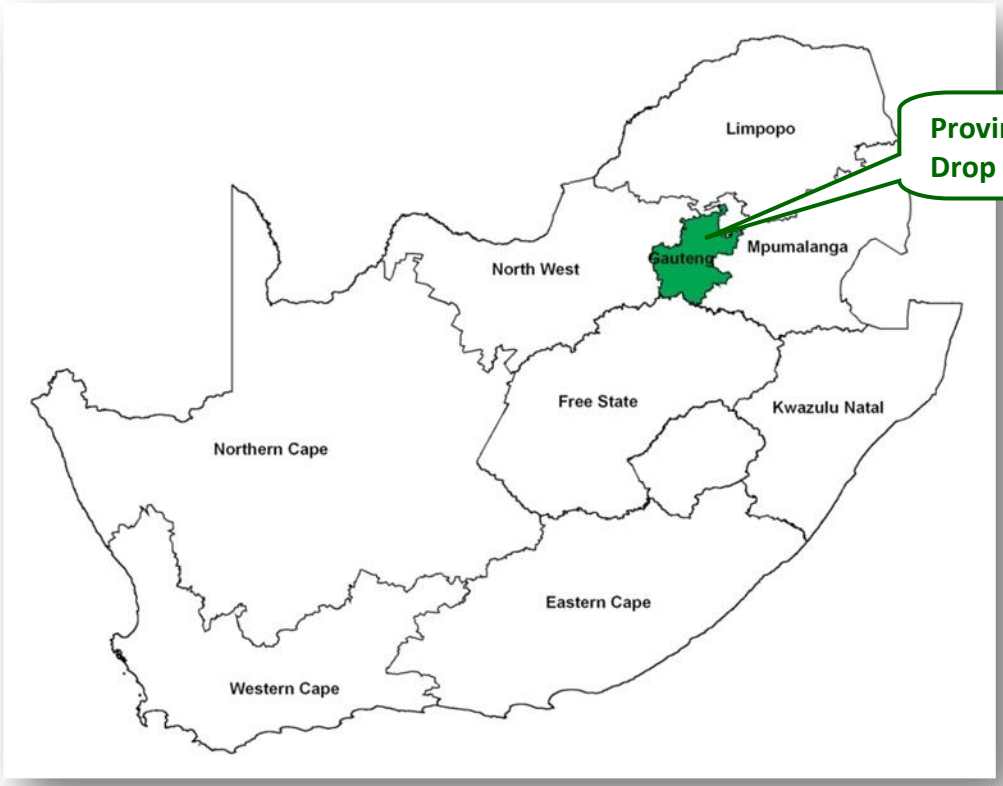
CHAPTER 5 – GAUTENG PROVINCE



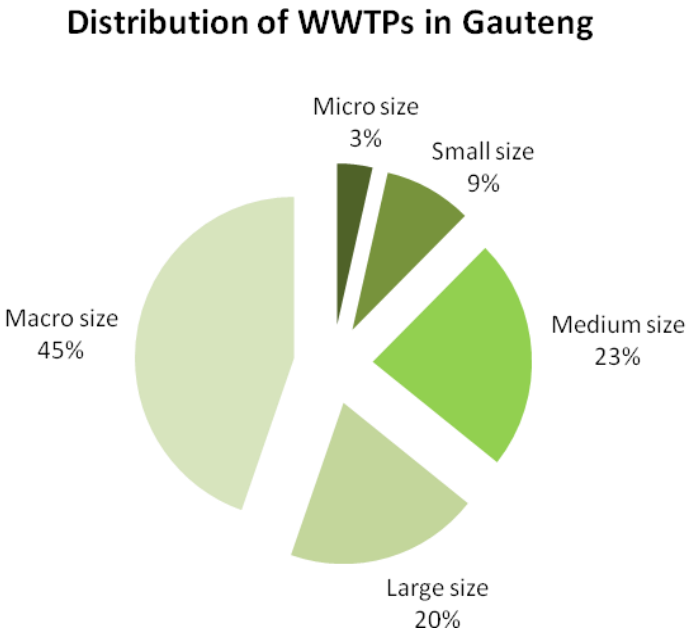
Provincial Best Performer

Johannesburg Metropolitan Municipality (WSP: Johannesburg Water) is the best performing municipality in Gauteng Province:

- ✓ 90.5% Municipal Green Drop Score
- ✓ 67% improvement on 2009 Green Drop status
- ✓ 100% of plants in low and medium risk positions
- ✓ 4 out of 6 systems received Green Drop Certification

Introduction

Wastewater services delivery is performed by twelve (12) Water Services Authorities in Gauteng via an infrastructure network comprising of 56 wastewater collector and treatment systems.



A total flow of 2579 Ml/day is received at the 56 treatment facilities, which has a collective hydraulic design capacity of 2595 Ml/day (as ADWF). This means that 99% of the design capacity is taken up by the current operational flows, leaving no surplus to meet the future demand without creating new capacity. However, experience has shown that infrastructure is usually over-sized by design, which allows for additional treatment capacity that can handle flows beyond design capacity without compromising the effluent quality. Gauteng municipalities have some of the best wastewater practitioners' in South Africa, and these plants are managed to consistently produce high quality effluent, where organic and hydraulic loads exceedthe theoretical design capacities. This achievement requires qualified and experienced plants managers, adequate resources and swift turnaround in scientific data and operational adjustments.

	MICRO SIZE <0.5 Mℓ/day	SMALL SIZE 0.5-2 Mℓ/day	MEDIUM SIZE 2-10 Mℓ/day	LARGE SIZE 10-25 Mℓ/day	MACRO SIZE >25 Mℓ/day	Undetermined	Total Mℓ/day
No of WWTPs	2	5	13	11	25	0	56
Total Design Capacity (Ml/day)	0.7	4.75	73.1	182	2334.5	0	2595.1
Total Daily Inflows (Ml/day)	0.71	3.4	59.6	131.6	2383.7	5	2579.0

**ADWF = Average dry Weather Flow*
WWTP = Wastewater Treatment Plants

Provincial Green Drop Analysis

Analysis of the Green Drop assessments and site inspection results indicate that performance vary from excellent to unsatisfactory.A total of **100% municipalities** were assessed during the 2010/11 Green Drop Certification.

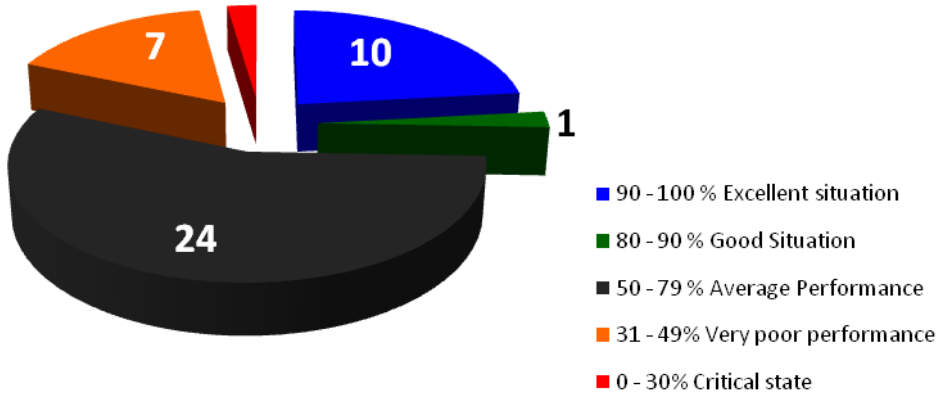
GREEN DROP COMPARATIVE ANALYSIS			
Performance Category	**2009**	**2010/11**	**Performance trend**
Incentive-based indicators			
Number of municipalities assessed	9 (82%)	12 (100%)	↑
Number of wastewater systems assessed	43	56	↑
Average Green Drop score	53%	68.1%	↑
Number of Green Drop scores ≥50%	35 (81%)	50 (89%)	↑
Number of Green Drop scores<50%	8 (19%)	6 (11%)	↑
Number of Green Drop awards	10	5	↓
Average Site Inspection Score	N/A	62.3%	N/A
PROVINCIAL GREEN DROP SCORE	N/A	78.8%	N/A

N/A = Not applied ↑ *= improvement,* ↓ *= digress,* → *= no change*

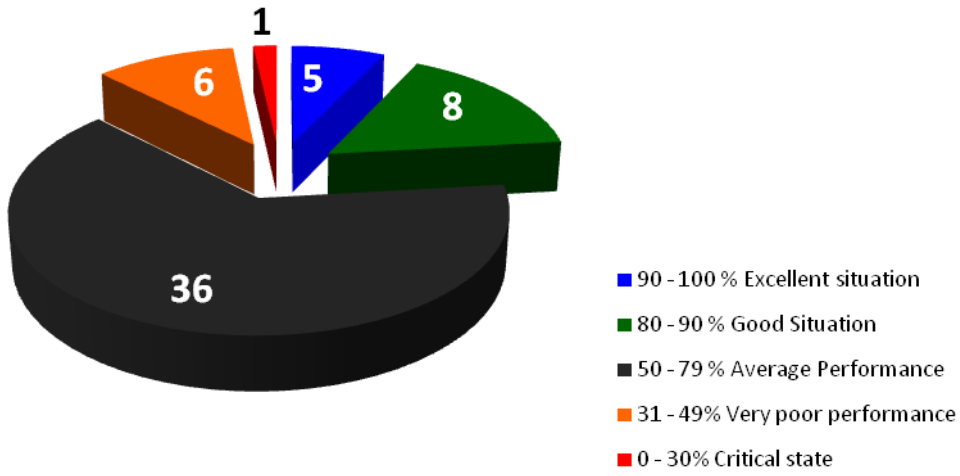
The 100% assessment coverage serves to affirmation theimproved awareness and renewed commitment forthcoming by municipal management in Gauteng. Through the Green Drop process, municipalities are renewing their operational baselines and reprioritise their plans with the primary objective of raising the current performance status in terms of municipal wastewater management. The incentive-based regulatory approach succeeds to act as a positive stimulus to facilitate improved performance and public accountability, whilst establishing essential systems and processes to sustain and measure gradual improvement.

Whereas only 35 systems obtained Green Drop scores ≥50% in 2009, 50 systems obtained >50% in the 2010/11 Green Drop cycle. Unfortunately, the excellent performers (blue pie) numbers decreased, which means that only 5 systems achieved Green Drop status in 2010/11 compare to 10 in 2009. On average, the GDC scores increased from 53 to 68.1%, indicating a considerable improvement in the average performance by municipalities. However, the most significant statistic is the Provincial Green Drop Score of 78.8%, which place Gauteng in the third place of top performing Provinces in the country next to Kwa-Zulu Natal and Western Cape.

Green Drop Assessment Results: 2009



Green Drop Assessment Results: 2010 / 2011



When comparing 2010/11 Green Drop results with 2009, the following trends are observed:

- ✓ 13 more systems were assessed in 2010 (56) compared to 2009 (43)
- ✓ 5 systems achieved Green Drop Certification, indicating 4 systems are considered 'excellent' (>90%). This marks a digress from 10 excellent systems achieved in 2009
- ✓ 2% 'good systems' in 2009 improved to 14% in 2010/11
- ✓ 16% of systems were in 'very poor state' in 2009 compared to 11% in 2010/11
- ✓ 3% systems were in 'critical state' in 2009 compared to 2% in 2010/11.

Note: the reduced number of plants that achieved Green Drop status 2010/11 is of concern, as Gauteng represents one of the 'excellence pockets' in wastewater management for South Africa. However, readers need to be mindful that Green Drop Certification follows a regulation strategy that facilitates **gradual and sustainable improvement**.... Thereby, Green Drop requirements become more stringent with every assessment cycle. Municipalities who merely 'maintained' their wastewater on same levels year in and out, is likely to achieve reduced Green Drop scores, whilst municipalities that drive 'continuous' improvement, are likely to be awarded with improved Green Drop scores with each assessment cycle.

Provincial Risk Analysis

The Green Drop requirements are used to assess the entire value chain involved in the delivery of municipal wastewater services, whilst the risk analyses focus on the treatment function specifically. Gauteng is the only province that has a 3 year trends analysis, as this process started in 2008.

CUMULATIVE RISK COMPARATIVE ANALYSIS				
Performance Category	**2008**	**2009**	**2010/11**	**Performance trend[2009-2011]**
Risk-based indicators				
Highest CRR	25	31	32	↓
Average CRR	13.5	14.3	15.3	↓
Lowest CRR	5	7	6	↑
Average Design Rating (A)	2.5	2.8	2.6	↑
Average Capacity Exceedance Rating (B)	3.3	3.3	3.6	↓
Average Effluent Failure Rating (C)	3.2	3.5	4.4	↓
Average Technical Skills Rating (D)	1.7	1.5	1.6	↑
AVERAGE % DEVIATION FROM maximum-CRR	26.0	48.0	58.5	↓

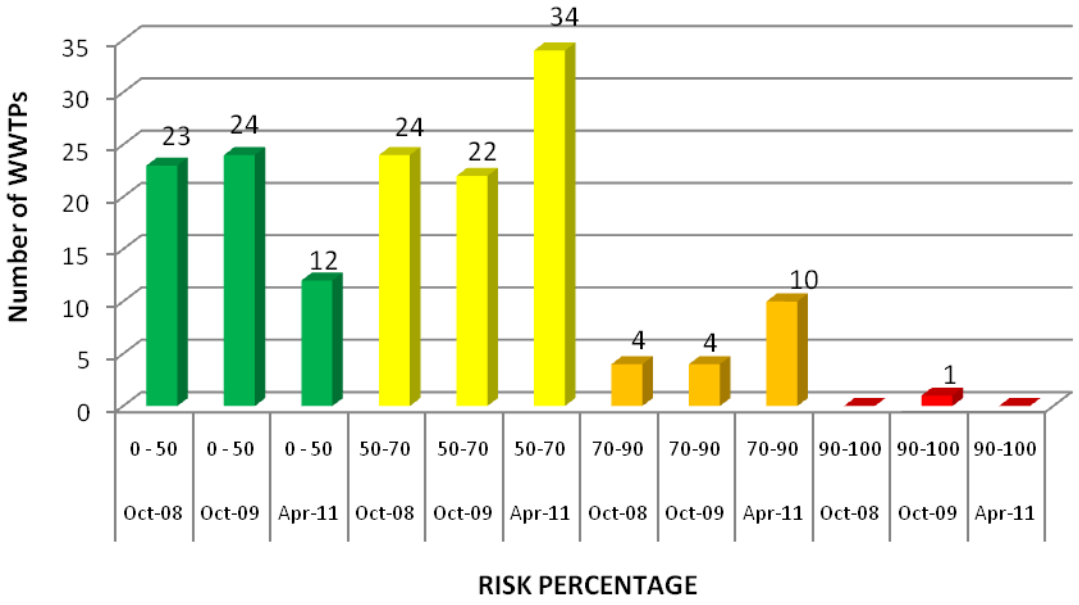
N/A = Not applied ↑ *= digress,* ↓*=improvement,* →*= no change*

From the above table, it can be observed that the Province not been successful in turning around the movement of risk towards higher risk scenarios. The sum effect is that the average CRR%deviation increased from 14.3 to 15.3%, indicating that efforts (and resources) need to be intensified to ensure that treatment plants move consistently into a lower risk space. These municipal treatment plants are clearly identified in this Chapter under "*Regulatory Impression*". The regulatory concern is implicit: "Gauteng municipal infrastructure transport and treat 49% of South Africa's wastewater on a daily basis. The upwards risk movement and digress in CRR_{max} presents a very real threat to Gauteng's water resources and economy, which again link to GDP, job creation and a host of other national priorities.

The CRR analysis further points out that considerable effort has already been made to address treatment capacity, as is seen in the lower weighting against the CRR 'A' factor.However, the risk elements pertaining to treatment capacity exceedance and effluent quality remains problematic.

When observing the movement of risk in the following bar-chart, it can be seen that the number of plants in high risk space increase from 4 to 10 over the past year. The number of plants in low risk space decreased from 24 to 12, whilst a corresponding increase in medium risk space from 22 to 34 takes place. Overall, this trend is extremely alarming, as a steady movement is observed from low- and medium risk positions to high and critical risk positions.

Risk Profile: CRR as % of CRRmax



% Deviation = CRR/CRR(max) TREND	90 – 100% Critical risk WWTPs
	70 - <90% High Risk WWTPs
	50-<70% Medium risk WWTPs
	<50% Low Risk WWTPs
	Less 50% Low Risk WWTPs

Experience has learnt that the cost and specialist resources are much higher to address critical risk scenario, compared to earlier interventions when detecting early warning signals of a plant moving into distress. Gauteng cannot afford this digress, having the responsibility of treating >940 000 000 000 litres of wastewater per year. For this reason, the Regulator has introduced Wastewater Risk Abatement Plans (W_2RAP) as one approach to focus and rectify the 'primary risk areas' before high risk scenarios develop. Further work is being done by the Department of Water Affairs to ensure that support programmes are aligned to risk abatement, and that support is expanded to address municipalities showing early signs of distress, as opposed to mobilising support when already in critical stage. Collaboration within the water sector is required to work collectively to redress this development, and use the Green Drop results to monitor progress (or further digress) on an annual basis.

The following municipalities are in high risk positions in 2010/11 and placed under regulatory surveillance:

Priority	WSA Name	2011 Average CRR/CRRmax % deviation	WWTPs in high risk space
1	Mogale City LM	72%	Percy Stewart, Flip Human, Magaliesburg
3	Lesedi LM	65%	Meyerton
4	Ekurhuleni Metro	61%	Rooiwal, Sunderland Ridge, Zeekoegat
5	City of Tshwane	61%	Welgedacht, Jan Smuts, Vlakplaats

High risk WSA and plants

Conclusion

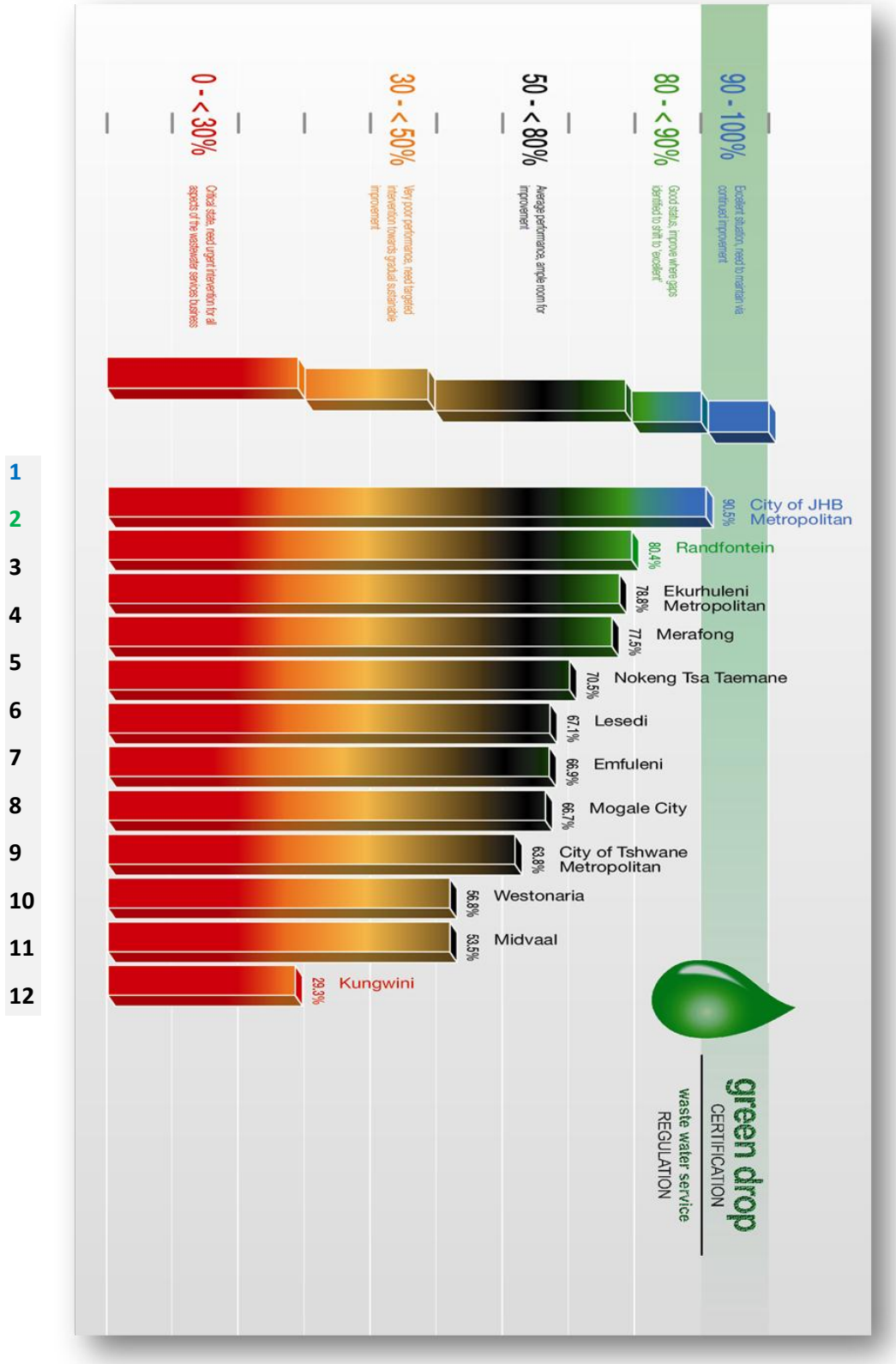
The Green Drop results for 2010-2011 indicated that municipal wastewater management in Gauteng vary from excellent to unsatisfactory, as indicate by the above Performance Log. Whilst the overall business of wastewater management in Gauteng as a whole seems satisfactorywith a Provincial Green Drop Score allocation of **78.8%**, the increased risk profile for treatment plants are alarming and require the attention of the water sector and local government sector. Gauteng is taking the 3rd position of best performing provinces in the country.

Five Green Drop Certificates are awarded in Gauteng:

- **4 Green Drops** : Johannesburg Metropolitan Municipality / Johannesburg Water
- **1 Green Drop** : Ekurhuleni Metropolitan Municipality / ERWAT.

Performance Barometer

The following log scale indicates the various positions that municipalities hold with respect to their individual Municipal Green Drop Scores:



Water Services Authority: **City of Johannesburg Metropolitan Municipality**

Municipal Green Drop Score: **90.5%**

Performance Area	*Systems*	Northern Works	Bushkoppies	Olifantsvlei
Process Control, Maintenance & Management skills		***100***	***100***	***95***
Monitoring Programme		***100***	***100***	***100***
Credibility of Sample Analyses		***100***	***100***	***100***
Submission of Results		***75***	***100***	***100***
Wastewater Quality Compliance		***100***	***48***	***100***
Failure Response Management		***100***	***100***	***100***
Bylaws		***100***	***100***	***100***
Treatment & Collector Capacity		***92.5***	***92.5***	***92.5***
Asset Management		***62.5***	***62.5***	***62.5***
Bonus Scores		82.5	82.5	82.5
Penalties		0	0	0
Green Drop Score (2011)		**92.4% (↑)**	**82.2% (↓)**	**93.1% (↑)**
Green Drop Score (2009)		94%	94%	92%
Treatment Capacity (Ml/d)		450	200	200
Operational % i.t.o. Capacity		94%	110%	105%
Cumulative Risk Rating (CRR)		23	24	22
% i.t.o. Maximum Risk Rating		**47.9% (↓)**	**63.2% (↑)**	**57.9% (↑)**

Performance Area	*Systems*	Goudkoppies	Driefontein	Ennerdale
Process Control, Maintenance & Management skills		***100***	***57.5***	***100***
Monitoring Programme		***100***	***100***	***100***
Credibility of Sample Analyses		***100***	***100***	***100***
Submission of Results		***100***	***100***	***100***
Wastewater Quality Compliance		***100***	***100***	***95***
Failure Response Management		***100***	***100***	***100***
Bylaws		***100***	***100***	***100***
Treatment & Collector Capacity		***92.5***	***92.5***	***85***
Asset Management		***57.5***	***57.5***	***62.5***
Bonus Scores		82.5	82.5	82.5
Penalties		0	0	0
Green Drop Score (2011)		**92.9% (↑)**	**88.6% (↓)**	**91.4% (↑)**
Green Drop Score (2009)		94%	94%	94%
Treatment Capacity (Ml/d)		150	35	8
Operational % i.t.o. Capacity		90%	88%	84%
Cumulative Risk Rating (CRR)		17	12	8
% i.t.o. Maximum Risk Rating		**44.7% (↑)**	**42.9% (↓)**	**34.8% (↑)**

NI - No information NA- Not assessed

Regulatory Impression

The City of Johannesburg Metropolitan Municipality has performed ***excellently*** during the Green Drop assessments and achieved 4 Green Drop Certifications out of the 6 systems. The Metro team managed to maintain their previous Green Drop status (with one exception) via meticulous planning and risk-based decisions and implementation, in order to meet the expectations of the regulation programme. Close cooperation is observed between the WSA and its Water Services Provider, Johannesburg Water.

The Green Drop requirements are largely met, although room for further improvement is noted in the areas where lower scores were awarded. In particular, the Bushkoppies final effluent compliance needs to be rectified to ensure that Johannesburg reaffirm a complete Green Drop Certification status. The team is to be congratulated on exceeding the DWA requirements on effluent quality, and for retaining and building the strong technical skills base that underwrites to a large extent the success of the City.

In verification of the City's **Green Drop Status**, the risk profile for the six wastewater treatment plants indicate that 4 of the 6 plants have increased its risk profile over the past year, but that all the plants still reside in low risk space. This margin should be tracked closely and in ensuring that volatile risks are identified as the city landscape continues to change. Analytical tools such as Green Drop, CRR and W_2RAP may assist to assess the contingencies and how those may impact on sustainable growth in Johannesburg with appropriate mitigation plans.

4 JOHANNESBURG SYSTEMS ARE GREEN DROP CERTIFIED

Johannesburg Northern Works – achieving excellent biological phosphate removal and revert to chemical dosing as a secondary measure.

Site Inspection Score

Olifantsvlei 87.1%

The Olifantsvlei plant was inspected to verify the Green Drop findings and was found to be in very good condition with hands-on management practices evident:

- Classification status is not displayed, but manuals and procedures available
- Adequate maintenance records available to include 6 monthly vibration testing and thermal imaging testing on all motors and gearboxes. Works orders for scheduled maintenance is available, but is not detailed enough. Concern about lack of general maintenance such as oil checks etc. Currently implementing the SAP Maintenance Module.
- Monitoring equipment functional and calibrated
- SCADA system well used to operate plant and store essential monitoring data and trends
- Overall appearance of plant is very good, neat and orderly with adequate attention to health, hygiene and workplace satisfaction
- Civils and mechanicals in good condition, one blower (standby) at inlet work not operational
- PSTs in good condition, good settling, even overflow
- Balancing dam in good condition ito mechanicals and civils
- Fermenters in good condition but need cleaning, build up of unsightly screenings
- Excellent clarification obtained during secondary settling
- No chlorine disinfection. Use sunlight via 12 day retention time in the maturation dams with Plug Flow (840 000m^2 x 2.5m).

Top: Use of SCADA to operate and manage plant, use to store records and draw trends

Below: Clear effluent from secondary clarifiers

Water Services Authority: **City of Tshwane Metropolitan Municipality**

Municipal Green Drop Score: **63.8%**

Performance Area / *Systems*	Babalegi	Baviaanspoort	Daspoort	Klipgat
Process Control, Maintenance & Management skills	60	82.5	92.5	82.5
Monitoring Programme	90	90	90	100
Credibility of Sample Analyses	70	85	85	62.5
Submission of Results	100	100	100	100
Wastewater Quality Compliance	0	20	48	20
Failure Response Management	22.5	22.5	22.5	77.5
Bylaws	100	100	100	100
Treatment & Collector Capacity	100	100	100	100
Asset Management	57.5	57.5	57.5	65
Bonus Scores	0	0	12.5	25
Penalties	1	0	0	0
Green Drop Score (2011)	**47.4% (↓)**	**58.4% (↓)**	**69.0% (↓)**	**67.4% (↓)**
Green Drop Score (2009)	66%	63%	92%	68%
Treatment Capacity (Ml/d)	4.7	58	55	55
Operational % i.t.o. Capacity	43%	85%	69%	73%
Cumulative Risk Rating (CRR)	12	20	18	16
% i.t.o. Maximum Risk Rating	66.7% (↑)	60.6% (↑)	54.5% (↓)	48.5% (↓)

Performance Area / *Systems*	Rietgat	Rooiwal	Sandspruit	Sunderland Ridge
Process Control, Maintenance & Management skills	100	93	73	100
Monitoring Programme	75	100	80	100
Credibility of Sample Analyses	85	70	55	85
Submission of Results	100	100	100	100
Wastewater Quality Compliance	20	20	20	20
Failure Response Management	50	23	23	64
Bylaws	100	100	100	100
Treatment & Collector Capacity	100	100	100	100
Asset Management	58	58	58	58
Bonus Scores	12.5	12.5	12.5	52.5
Penalties	0	0	0	0
Green Drop Score (2011)	**62.6% (↓)**	**60.9% (↓)**	**53.1% (↓)**	**70.5%(↑)**
Green Drop Score (2009)	89%	73%	68%	68%
Treatment Capacity (Ml/d)	27	220	20	65
Operational % i.t.o. Capacity	67%	106%	54%	102%
Cumulative Risk Rating (CRR)	13	32	12	25
% i.t.o. Maximum Risk Rating	46.4% (↑)	74.4% (↑)	52.2% (↑)	75.8% (↑)

Performance Area	*Systems*	**Temba**
Process Control, Maintenance & Management skills		***90***
Monitoring Programme		***90***
Credibility of Sample Analyses		***70***
Submission of Results		***100***
Wastewater Quality Compliance		***20***
Failure Response Management		***23***
Bylaws		***100***
Treatment & Collector Capacity		***92.5***
Asset Management		***58***
Bonus Scores		12.5
Penalties		0
Green Drop Score (2011)		**58.9% (↓)**
Green Drop Score (2009)		68%
Treatment Capacity (Ml/d)		12.5
Operational % i.t.o. Capacity		80%
Cumulative Risk Rating (CRR)		13
% i.t.o. Maximum Risk Rating		**56.5% (→)**

NI - No information
NA- Not assessed

Regulatory Impression

The Tshwane Metropolitan Municipality performed below expectation and shows a disappointing deviation from the 2009 status whereby the City previously held two Green Drops Certificates. Both GDC statuses were lost after the 2010 assessment, whereby the absence of a multi-disciplinary team did not impress the assessor panel. The overall municipal score of 63.8% indicates that the wastewater services are not being managed effectively and that the requirements of the regulation programme are largely not being met. Despite having a devoted team in place, key gaps are identified in credibility of data, compliance of final effluent quality, failure management protocol and asset management.

The City has however done remarkable work on the practical application of the GDS system and the recent adoption of a risk based approach to sanitation services delivery, is followed with encouragement. Decisions that deal with the requirement for improved technical and plant managerial skills, allocation of adequate financial resources and ensure that bottlenecks that hamper supply of goods and services against the supply chain management procedures need to be expedited. The municipality is however commended for putting a management- and performance improvement plan in place to rectify the shortcomings. The Regulator holds the opinion that Tswhane is not far from achieving Green Drop status judging by the high level of dedication and determination shown by the technical staff.

The negative trend in the respective Cumulative Risk Ratios (CRRs) of the treatment plants are noted with concern. Seven of the 10 plants show trends of increased risk profiles **(↑)**, meaning that wastewater treatment systems are heading towards a risk positions that would be difficult and resource intensive once entering high risk space, with consequential hazard to the receiving environment and public health in the short to medium term future. Three plants are now residing in **high risk** space – Rooiwal, Sunderland Ridge and Zeekoegat. The attention of municipal administration and governance are required, to mobilise appropriate resources to support a positive turnaround towards the Green Drop 2011/12 assessments.

Green Drop Findings:

1. Two of the 10 systems do not meet the criteria that deals with technical skills and registration thereof, and lacks the necessary maintenance and procedures for optimal plant management.
2. Three of the 10 treatment plants have reached or exceeded its design capacity, and the effluent quality indicated that the plants are not coming with this artificial load.
3. Six of the 10 plants show shortcomings in credibility of data and interpretation thereof on plant level.
4. All plants are non-compliant in terms of the legally required effluent discharge quality, with Babelegi showing a 0% compliance. Significant skills, planning and infrastructure investment are required to reduce the phosphate and nitrogen loads to the receiving environments.
5. Eight of the systems do not have adequate failure response management protocols in place.
6. The WSA has not institutionalised asset management to an extent where wastewater management are informed and guided by the asset condition and lifecycle margins. Thus the findings of the general transgression against all Green drop requirements are considered a significant and severe risk.

Site Inspection Score

Zeekoegat	**95.8%**
Rooiwal East	**63.5%**
Rooiwal North	**64.2%**

The Zeekoegat plant was inspected to verify the Green Drop findings:

- Classification status is displayed and O&M manuals available on site. Each process controller has hard copy
- Scheduled or completed maintenance work not available at site, but job card system in place to handle maintenance requests
- Daily analysis are done onsite and the Daspoort laboratory (centralised) is used for comprehensive analysis
- The terrain is well maintained and neat
- Screening and degritting facilities are well operated and maintained. Evidence of repair work on duty screens. Flow measurements recorded daily.
- The settling tanks and activated BNR sludge plant are well operated within their design specification
- Visually good quality effluent receives final chlorination before discharge
- Maturation ponds are well maintained and home to bird and fish varieties
- DAF unit is well maintained for sludge handling, whilst new filter belt presses under construction.

The Rooiwal plants (north and east) were found to be in less desirable state than the Zeekoegat plant, with some operational flaws that could be optimised. The following observations account for the northern plant:

- Works Classification on display, O&M manual under development
- No on-site monitoring undertaken, only compliance monitoring conducted by main laboratory. This is not best practice for a 54 Ml plant. Basic analysis such as free chlorine not recorded for 2011 – highly undesirable situation
- Auto-analyser will be implemented in future, but this does not address the operational monitoring or lack of process control aspects
- Plant is well maintained and clean, neat
- Recent incidents of staff injury, open access to plant and cable theft has been recorded and is being investigated

- Screen removal and flow measurement are adequately handled, however grit removal is compromised and repairs are underway
- Desludging of PSTs may not be optimally operated and need refinement, also to consider a more steady load of the anaerobic digesters
- Recently refurbished biofilters are running well
- Ferrichloride used for P removal, desludging from humus tanks could be optimised
- Chlorination takes place, but no residual chlorine monitoring documented
- Anaerobic digesters are not operated or monitored according to good practice, a number of improvement can be effected
- New belt presses to be commissioned for improved sludge management

The following observations apply to the eastern plant:

- Maintenance schedules not available and O&M manual is under development
- Some operational values recorded (MLSS, SVI) but not residual chlorine
- Various components of the activated sludge not functional or optimised
- MLSS, DO concentrations not optimal, now WAS recycle, nutrient and loading parameters not in spec
- Poor sludge settling in clarifiers and poor effluent quality, probably as result of unfavourable operational conditions in ASP
- Disinfection not monitored by means of residual chlorine, and unlikely to be effective with high solids carry-over
- Condition of maturation ponds not good, await procurement to commence maintenance and cleaning procedures
- Quality of effluent to receiving river visibly poor with high solids content – unacceptable condition for a plant this size with marked impact on environment
- DAF unit for sludge handling not operational for 12 months due to maintenance and associated problems. Alternative solutions not feasibly employed, as evident from the inspection. Sludge lagoon filled to maximum capacity
- Anaerobic digesters not operated as per design, civil structures also being compromised.


Left: sludge carry over at the sludge settling tanks; Right: ponds filled to capacity at the Rooiwal plant


Left: well maintained fine bubble aeration; Right: construction ongoing at the Zekoegat plant

Water Services Authority: **Ekurhuleni Metropolitan Municipality**

Municipal Green Drop Score: **78.8%**

Performance Area	*Systems*	Welgedacht	Vlakplaas	Olifantsfontein	Waterval
Process Control, Maintenance & Management skills		82.5	100	70	100
Monitoring Programme		50	100	100	85
Credibility of Sample Analyses		100	100	100	100
Submission of Results		100	100	100	100
Wastewater Quality Compliance		38	48	48	48
Failure Response Management		88.8	88.8	88.8	88.8
Bylaws		100	100	100	100
Treatment & Collector Capacity		90	100	70	100
Asset Management		85	85	85	85
Bonus Scores		8.75	35	43.8	43.8
Penalties		0	0	0	0
Green Drop Score (2011)		**71.2% (↑)**	**84.5% (↑)**	**79.4% (↑)**	**83.9% (↑)**
Green Drop Score (2009)		55%	79%	55%	79%
Treatment Capacity (Ml/d)		35	83	105	155
Operational % i.t.o. Capacity		173%	157%	83%	124%
Cumulative Risk Rating (CRR)		20	24	19	24
% i.t.o. Maximum Risk Rating		71.4%(↑)	72.7%(↑)	50.0%(↓)	63.2%(↑)

Performance Area	*Systems*	Anchor	Hartbeesfontein	Tsakane	Rondebult
Process Control, Maintenance & Management skills		77.5	82.5	90	70
Monitoring Programme		90	100	85	100
Credibility of Sample Analyses		92.5	100	100	77.5
Submission of Results		100	100	100	100
Wastewater Quality Compliance		20	48	20	48
Failure Response Management		88.8	88.8	88.8	88.8
Bylaws		100	100	100	100
Treatment & Collector Capacity		45	85.5	72.5	100
Asset Management		65	85	85	85
Bonus Scores		8.75	33.8	27.5	33.8
Penalties		0	0	0	0
Green Drop Score (2011)		**81.2% (↑)**	**81.2% (↑)**	**70.1% (↑)**	**80.3% (↓)**
Green Drop Score (2009)		55%	55%	55%	100%
Treatment Capacity (Ml/d)		32	45	10	36
Operational % i.t.o. Capacity		121%	129%	94%	64%
Cumulative Risk Rating (CRR)		19	19	15	17
% i.t.o. Maximum Risk Rating		67.9% (↑)	67.9% (↑)	65.2% (↑)	60.7% (↑)

Performance Area	*Systems*	Herbert Bickley	Dekama	J.P. Marais	Jan Smuts
Process Control, Maintenance & Management skills		***92.5***	***92.5***	***77.5***	***77.5***
Monitoring Programme		***100***	***100***	***85***	***85***
Credibility of Sample Analyses		***100***	***100***	***100***	***100***
Submission of Results		***100***	***100***	***100***	***100***
Wastewater Quality Compliance		***20***	***72***	***20***	***20***
Failure Response Management		***88.8***	***88.8***	***88.75***	***88.8***
Bylaws		***100***	***100***	***100***	***100***
Treatment & Collector Capacity		***92.5***	***100***	***52.5***	***52.5***
Asset Management		***85***	***86***	***85***	***70***
Bonus Scores		21.3	21.3	27.5	27.5
Penalties		0	0	0	0
Green Drop Score (2011)		**73.3% (↑)**	**90.0% (↓)**	**66.8% (↑)**	**64.6% (↑)**
Green Drop Score (2009)		55%	100%	55%	55%
Treatment Capacity (Ml/d)		12.5	36	15	10
Operational % i.t.o. Capacity		141%	78%	80%	121%
Cumulative Risk Rating (CRR)		15	12	13	17
% i.t.o. Maximum Risk Rating		65.2% (↑)	42.9% (→)	56.5% (↓)	73.9% (↑)

Performance Area	*Systems*	Rynfield	Benoni	Ester Park	Carl Grundling
Process Control, Maintenance & Management skills		***77.5***	***77.5***	***67.5***	***77.5***
Monitoring Programme		***85***	***85***	***100***	***85***
Credibility of Sample Analyses		***100***	***70***	***100***	***100***
Submission of Results		***100***	***100***	***100***	***100***
Wastewater Quality Compliance		***20***	***20***	***5***	***48***
Failure Response Management		***88.8***	***88.8***	***88.8***	***88.8***
Bylaws		***100***	***100***	***100***	***100***
Treatment & Collector Capacity		***72.5***	***52.5***	***92.5***	***80***
Asset Management		***70***	***85***	***85***	***85***
Bonus Scores		8.75	8.75	27.5	33.8
Penalties		0	0	0	0
Green Drop Score (2011)		**64.8% (↑)**	**63.5% (↑)**	**66.9% (↑)**	**78.7% (↑)**
Green Drop Score (2009)		55%	55%	55%	55%
Treatment Capacity (Ml/d)		13	16	0.4	5
Operational % i.t.o. Capacity		62%	63%	178%	63%
Cumulative Risk Rating (CRR)		13	14	11	10
% i.t.o. Maximum Risk Rating		56.5% (↑)	60.9% (↓)	61.1% (↑)	43.5% (↑)

Performance Area	*Systems*	**Daveyton**
Process Control, Maintenance & Management skills		***92.5***
Monitoring Programme		***85***
Credibility of Sample Analyses		***100***
Submission of Results		***100***
Wastewater Quality Compliance		***20***
Failure Response Management		***88.8***
Bylaws		***100***
Treatment & Collector Capacity		***100***
Asset Management		***85***
Bonus Scores		27.5
Penalties		0
Green Drop Score (2011)		**73.1% (↓)**
Green Drop Score (2009)		79%
Treatment Capacity (Ml/d)		16
Operational % i.t.o. Capacity		59%
Cumulative Risk Rating (CRR)		15
% i.t.o. Maximum Risk Rating		**65.2% (↑)**

NI - No information *NA- Not assessed*

Regulatory Impression

The Ekurhuleni Metropolitan Municipality performed below expectations for this year's Green Drop assessments. The municipality held two Green Drops during 2009, but none in 2010/11. However, the overall improvement in GDC scores for 14 out of the 17 wastewater systems is commendable. The municipal teamwere well prepared with first-rate municipal business knowledge, complimented by a well organised and steadfast WSP (ERWAT) to partake in the assessment. The high competency and synergy within the two teams are areas of strength to improve the future performance of the City. At present, the overall municipal score of 78.1% indicates that the wastewater services are being managed well, but not necessarily excellently. With many of the systems assessed, the expectations of the regulation programme are largely being met. However, in the majority of systems, particular gaps need to be addressed to meet excellence criteria, with the single most important parameter being final effluent quality compliance.

The City has however done outstanding work on practical application of asset management of collector and treatment systems. The risk-based approach taken by the City has earned some credits and the Regulator is encouraged with the quality of work undertaken towards achieving the expected results in i.e. the Hartbeespoort catchment risk-based regulatory programme.

This approach will come in handy when observing the current negative trends in the respective Cumulative Risk Ratios (CRRs) in a large number of treatment plants. Thirteen of the 17 plants show trends of increased risk profiles (↑), meaning that wastewater treatment systems are heading towards a risk position that pose a risk to the receiving environment and public health in the short to medium term future. Three plants are in high risk space and need urgent and targeted attention – Vlakplaats, Jan Smuts and Welgedacht. The attention of municipal administration and governance are required, to mobilise appropriate resources to support a positive turnaround towards the Green Drop 2011/12 assessments. The Regulator trusts that this undesirable baseline will motivate the municipality to improve upon the current status without pause. ERWAT is doing particularly innovative work in the way

that residual risk is used to improve wastewater treatment performance, and progress will be followed during the regulatory engagements of 2011/12.

1 EKURHULENI SYSTEM IS GREEN DROP CERTIFIED

Green Drop Findings:

1. Ten of the 17 systems do not meet the criteria that deals with technical skills and registration thereof, and lacks the necessary maintenance and procedures for optimal plant management.
2. Eight of the 17 treatment plants have reached or exceeded its design capacity, and the effluent quality indicated that the plants are not coming with this artificial load.
3. Seven of the 17 plants show shortcomings in terms of individual requirements of technical capacity and planning.
4. All plants are non-compliant in terms of the legally required effluent discharge quality, and this transgression need to be addressed as a matter of priority.
5. Alongside this requirement is the need to finalise water use licence conditions with the provincial / national authority. The GDC assessment process gave the WSA the benefit of using General Limits where finality has not been reached on final effluent quality and load discharge.

Site Inspection Score

Hartbeesfontein 71%

The Hartbeesfontein WWTP was inspected to verify the Green Drop findings and fell slightly short in physical condition when compared to the Green Drop score of 81%:

- Plant appearance is reasonably good but not excellent. Closer inspection revealed unhygienic rooms and facilities, buildings maintenance not up to standard and remained unnoticed by the operating staff and plant supervisor
- Manuals, certificates, maintenance and operational logbooks in place with emergency contact numbers
- On-site analytical kits in place, however mainstream analysis done in ERWAT laboratory
- Screening and grit removal in place, some grit chambers not operational
- Settling good, activated sludge plant operated well with bubble aeration
- Strong management members within the WSP team ensure critical linkages between scientific, engineering and operational aspects
- Site based staff motivated and positive attitudes towards workplace environment and responsibilities, howeverlow confidence on MLSS and DO operational margins.
- Secondary clarifiers some floc carryover, more prominent in areas of weir damaged rapid flows
- Anaerobic digestion in place, with classified sludge

Left: Good sludge properties in aerated activated sludge BNR; Right: Well maintained site, with clear safety signs and practical landscaping

Water Services Authority:	**Emfuleni Local Municipality**

Municipal Green Drop Score: **66.9%**

Performance Area	*Systems*	**Rietspruit**	**Leeukuil**	**Sebokeng**
Process Control, Maintenance & Management skills		***100***	***100***	***100***
Monitoring Programme		***40***	***40***	***50***
Credibility of Sample Analyses		***85***	***100***	***100***
Submission of Results		***100***	***100***	***100***
Wastewater Quality Compliance		***20***	***72***	***20***
Failure Response Management		***100***	***45***	***100***
Bylaws		***100***	***100***	***100***
Treatment & Collector Capacity		***55***	***70***	***50***
Asset Management		***62.5***	***57.5***	***85***
Bonus Scores		20	20	28.8
Penalties		0	0	0
Green Drop Score (2011)		**61.1% (↑)**	**72.7% (↑)**	**66.6% (↑)**
Green Drop Score (2009)		NA – 0%	NA – 0%	NA – 0%
Treatment Capacity (Ml/d)		36	41	100
Operational % i.t.o. Capacity		81%	61%	128%
Cumulative Risk Rating (CRR)		15	11	21
% i.t.o. Maximum Risk Rating		**53.6% (↓)**	**39.3% (↓)**	**63.6% (→)**

NI - No information
NA- Not assessed

Regulatory Impression

The Emfuleni Local Municipality has performed below expectation during the Green Drop assessments indicating that the wastewater services are not being managed according to the expectations of the regulation programme. However, all indications are pointing towards an improved status, when considering the positive trend (↑) in Green Drop scores, the reduced C RR risk profiles (↓), and the preparedness of a committed and multi-disciplinary team for the assessment.

The overall municipal score of 66.9% and an in-depth analysis of the GDC scores indicate that the most prominent gaps to be addressed by Emfuleni points to higher level management aspects regarding treatment and collector capacity, planning, resources, and asset management. The critical parameter that would compromise a Green Drop status would still be the final effluent quality compliance, although pertinent gaps are also noted in the monitoring programme. The lack of a risk-based approach would set back raising critical control point prioritisation such as the overloading of the Sebokeng plant, spillage risk at particular pumpstations or electricity failures.

On a positive note, the municipality is commended for taking the first step to present their results for assessment. For this reason, the improvement(↑) is acknowledged whereby the previous 0% (no assessment) is lifted to 61-73% for 2010/11. From these results, Emfuleni can identify the critical gaps first, and take a risk-based approach to rectify the high-risk areas in a phased approach.

Green Drop Findings:

1. Three out of 3 wastewater systems cannot measure its full impact on receiving water and natural resources, as result of the inadequacy in the monitoring regime (to include catchment-, process and sludge monitoring).
2. None of the 3 treatment plants achieved effluent quality compliance in terms of physical, chemical and microbiological standards, although Leeukuil shows promise by achieving 72%.
3. Sebokeng is exceeding plant capacity and is unlikely to achieve effluent quality compliance and GDC status if not addressed.
4. Three out of 3 systems lack collector and treatment capacity planning and resources to implement the existing plans. On the part of treatment capacity, both hydraulic and organic capacity needs to be considered.
5. Lastly, the absence of a risk-based approach and adoption of integrated asset management principles, result in good infrastructure not being valued and maintained to extend it useful lifespan. This is bound to place a burden on the municipal budget and decision makers regarding aspects such as prioritising regional facilities, upgrading of existing facilities, control of extraneous flows and service agreements with neighbour WSAs or local industry. The transgression is significant when pausing to consider the financial sustainability of the municipality.

Right: Dated 1955 equipment being replaced, after service of 44 years

Below: stand-by generator to support critical unit functions during power outages

Site Inspection Score

Rietspruit 73.2%

The Rietspruit plant was inspected to verify the Green Drop findings:

- Classification status is not displayed, but manuals and procedures available
- Screens at inlet works recently refurbished and operational, but fine screen not operational
- Two of 4 PSTs not operational as sludge draw off pipes are blocked
- All 11 biofilters functional, good distribution
- Two of 6 humus tanks blocked and not operational
- Civil, electrical and mechanical components of activated sludge in good condition, design flaws being addressed
- Secondary clarifiers overloaded and functional to full capacity
- Disinfection is taking place and adequate stock in place
- Anaerobic digesters operational but area surrounding unkept
- Sludge drying beds unkept and poorly maintained

Left: unmaintained sludge drying beds; Right: scum formation on the seconday clarifiers under overload conditions

Water Services Authority:	**Kungwini Local Municipality**

Municipal Green Drop Score: **29.3%**

Performance Area	*Systems*	Godrich	Rethabiseng	Ekangala
Process Control, Maintenance & Management skills		5	5	5
Monitoring Programme		25	30	0
Credibility of Sample Analyses		85	70	70
Submission of Results		0	0	0
Wastewater Quality Compliance		10	20	20
Failure Response Management		0	0	0
Bylaws		40	40	40
Treatment & Collector Capacity		48	45	35
Asset Management		60	100	50
Bonus Scores		40	46.3	0
Penalties		1	1	0
Green Drop Score (2011)		**31.0% (↑)**	**37.4% (↑)**	**24.0% (↑)**
Green Drop Score (2009)		NA – 0%	NA – 0%	NA – 0%
Treatment Capacity (Ml/d)		3	1	2.5
Operational % i.t.o. Capacity		70%	NI (assume > 100%)	NI (assume > 100%)
Cumulative Risk Rating (CRR)		6	10	10
% i.t.o. Maximum Risk Rating		**33.3% (↓)**	**55.6% (→)**	**55.6% (↓)**

NI - No information
NA- Not assessed

Regulatory Impression

The Kungwini Local Municipality has performed unsatisfactory during the Green Drop assessments, indicating that the wastewater services are not being managed according to the expectations of the regulation programme. Many of the Green Drop requirements are not being met, with the most prominent gaps in managerial and technical skill, monitoring and compliance to requirements of water use authorisation, as well as various management procedures and protocol. These deficiencies result in an overall low municipal score of 29.3%.

It is encouraging to see that the municipality has prepared for the assessment, which raises its Green Drop status from a “no confidence” level to a measured baseline that would assist the municipality to identify the key gaps in water services delivery and to address those in a risk-based approach. In terms of the municipality’s risk profile, the CRRs show an encouraging drop in risk ratios, in line with the improved Green Drop scores.

Green Drop Findings:

1. Three of the 3 wastewater treatment works does have adequate monitoring of process, compliance and catchment water qualities in place. In addition, two of the plants do not measure and record its inflow to the plant and are unable to measure if the plant capacity is still sufficient for the daily operational flow.

2. The continued functioning of these works is completely unsustainable, and in the absence of a skilled and resourced team for all 3 systems. Planning should revolve around robust basic technology which could deliver upon the required effluent quality standards.
3. Should any of the plants face a disaster or emergency situation, it would not be in a position to deal with such, as the protocol and procedures are not in place.
4. Bylaws are not adequate in content and lacks implementation on the ground.
5. All 3 systems face severe shortcomings on aspects related to collector and treatment infrastructure capacity and planning.
6. Three of 3 treatment plants do not comply with effluent quality requirements. This transgression imposes a risk to public health and the environment.

Site Inspection Scores

Godrich	**13%**
Ekangala	**43%**

The Godrich and Ekangala WWTPs were inspected to verify the findings of the Green Drop assessment. Thefollowing observations were made for the Godrich plant:

- The surroundings are neat, high mast lighting is provided for night shift, and gate security records entrance and exit activities
- Staff is satisfied with the workplace environment and conditions
- No manuals, certificates, logbooks or on-site monitoring equipment is in place
- Flow logging is recorded daily
- Automatic function of screens not functional and operated manually
- Grit removal facility not functional, staff revert to costly TLB options to manually remove grit
- Five of 6 aerators and 1 of 2 mixers functional on the activated sludge plant
- Clarification is not adequately achieved, uneven flow distribution with sludge carry over
- Chlorination is in place, but not adhering to safety regulations
- Sludge lagoons are not well maintained.

Ekangala plant is found to be in condition of:

- The ponds are within 200 meters of community houses, not fenced (stolen) and not particularly well maintained. Extensive vegetation growth on and around ponds
- Manual screen and grit removal, limited equipment on site due to theft thereof
- Final effluent is not disinfected and used to irrigate the communal vegetable gardens
- Ponds seem to be overloaded and littered with solids. Vacuum tankers discharge directly into primary ponds.

Absence of activated sludge and incorrect F:M ratios resulting in foam conditions

Sludge accumulation in the pond system, highly overloaded

Water Services Authority: **Merafong Local Municipality**

Municipal Green Drop Score: **77.5%**

Performance Area	*Systems*	Khutsong	Kokosi /Fochville	Wedela
Process Control, Maintenance & Management skills		100	95	100
Monitoring Programme		90	90	90
Credibility of Sample Analyses		85	85	85
Submission of Results		100	100	100
Wastewater Quality Compliance		48	28	18
Failure Response Management		100	100	100
Bylaws		20	20	20
Treatment & Collector Capacity		85	92.5	72.5
Asset Management		90	90	90
Bonus Scores		73.75	73.75	73.75
Penalties		0	0	0
Green Drop Score (2011)		**79.3% (↑)**	**77.3% (↑)**	**70.8%(↑)**
Green Drop Score (2009)		55%	43%	39%
Treatment Capacity (Ml/d)		7.5	4	2
Operational % i.t.o. Capacity		73%	NI (assume > 100%)	67%
Cumulative Risk Rating (CRR)		12	11	9
% i.t.o. Maximum Risk Rating		52.2% (↑)	61.1% (↑)	50.0% (→)

Performance Area	*Systems*	Welverdiend	Oberholzer
Process Control, Maintenance & Management skills		95.5	100
Monitoring Programme		90	100
Credibility of Sample Analyses		70	85
Submission of Results		100	100
Wastewater Quality Compliance		0	28
Failure Response Management		100	100
Bylaws		20	20
Treatment & Collector Capacity		100	100
Asset Management		90	90
Bonus Scores		73.75	73.75
Penalties		0	0
Green Drop Score (2011)		**69.0% (↑)**	**79.5% (↑)**
Green Drop Score (2009)		36%	45%
Treatment Capacity (Ml/d)		1	8
Operational % i.t.o. Capacity		100%	55%
Cumulative Risk Rating (CRR)		10	12
% i.t.o. Maximum Risk Rating		55.6% (↑)	52.2% (↑)

NI - No information *NA- Not assessed*

Regulatory Impression

The Merafong Local Municipality has performed satisfactory during the Green Drop assessments, indicating that wastewater services are 77.5% on par towards meeting the expectations of the regulation programme. In addition, the 2010/11 Green Drop scores shows a marked improvement for ALL systems when compared with the 2009 results. The municipality is congratulated with their determined efforts to progress and advanced their wastewater service level.

Amidst the positive observations, hard work still lies ahead in order to meet best practice norms and standards. The most prominent gaps that need to be addressed in order to move the municipality into Green Drop Certification excellence space include credibility of sampling and analytical data, Bylaw implementation, treatment and collector capacity and most importantly – effluent quality compliance. It is disappointing to note that operational flows are still not monitored at Kokosi, serving the growing Fochville drainage area. Also, the hydraulic design capacity at the Welverdiend plant has been reached and required decisive action. These rectifications are certainly within reach for Merafong, considering the competence of technical and scientific team. The regulator is also alerting the WSA to improve practices related to inspections pertaining to losses from collector networks and pumpstations.

Risk analysis of the Merafong treatment plants indicate that all plants reside in medium risk space. However, a disconcerting trend is noticed whereby 4 of the 5 plants follow an increased CRR trend **(↑)**. The municipality need to take great care to monitor the respective risk elements that make up the CRR total and to rectify the underlying causes. A W_2RAP would be a suitable application.

Green Drop Findings:

1. Six out of 6 systems have space for improvement regarding credibility of sampling and quality control pertaining to analytical data.
2. One of 6 systems do not monitor operational flows, and hence, compromise further planning to ensure that plant capacity is adequate for development in this drainage area.
3. Six of 6 systems do not have adequate Bylaws in place, and implementation is lacking
4. 100% of plants do not comply to effluent quality limits as set by the national authority. This is a factor of concern, as the plants have the treatment capacity to achieve set standards. Furthermore, recent upgrades and refurbishment projects should have improved the effluent quality as key output performance parameter.
5. A risk-based approach linked to the existing asset management systems will improve the sustainable use of resources to focus on health and environmental risks factors.

Site Inspection Scores

Khutsong	**89%**
Oberholzer	**94%**

The Khutsong and Oberholzer plants were inspected to verify the Green Drop findings:

- All manual, maintenance reports, process log book and certificates are in place
- Khutsong does not have any ground cover or gardens and dust control is a problem, but buildings and paint work is well maintained. Lawns and gardens well kept at Oberholzer plant
- Plant is fenced with gate control – indemnity forms visitor safety protocol is in place
- Screening and grit classification in good working order, inflow measurement not done at Khutsong for 2 years, but in good order at Oberholzer
- Primary settling and final clarification in good order – slight oil & sludge build-up at Oberholzer
- Khutsong activated sludge plant well operated, but some of the equipment down on critical zones, which will result in decreased nitrogen and phosphate removal performance
- Three of 4 biofilters operational with good clarification in humus tanks
- Disinfection in order with surplus stock, sufficient contact time, with final flow monitoring
- Anaerobic digester/s functional, drying beds overloaded, but well operated.

Water Services Authority: **Lesedi Local Muncipality**

Municipal Green Drop Score: **67.1%**

Performance Area	*Systems*	Ratanda	Heidelberg
Process Control, Maintenance & Management skills		***97.5***	***90***
Monitoring Programme		***85***	***85***
Credibility of Sample Analyses		***41***	***41***
Submission of Results		***100***	***100***
Wastewater Quality Compliance		***20***	***20***
Failure Response Management		***61.3***	***75***
Bylaws		***80***	***80***
Treatment & Collector Capacity		***88***	***92.5***
Asset Management		***65***	***65***
Bonus Scores		65	65
Penalties		0	0
Green Drop Score (2011)		**66.5%** (↑)	**67.6%** (↑)
Green Drop Score (2009)		55%	NA – 0%
Treatment Capacity (Ml/d)		5	8
Operational % i.t.o. Capacity		112%	114%
Cumulative Risk Rating (CRR)		11	16
% i.t.o. Maximum Risk Rating		61.1%(↑)	69.6%(↑)

NI - No information *NA- Not assessed*

Regulatory Impression

The Lesedi Local Municipality delivered an average performance, although it inculcate to be a significant improvement on the 2009 Green Drop status. The overall municipal score of 67.1% indicates that the wastewater services are notmeeting the expectations of the regulation programme, but that it is certainly moving into a position of strength. Themunicipal practices related to technical skills, credibility- and compliance of effluent quality, as well as asset management practice, are the predominant gaps that informed the current GDC sore. Judging by the plant's capacity, the plants need to be upgraded and process control optimised, and extraneous flows reduced – whichever factor/s are found to cause the hydraulic overload of the plants.

From the 2010/11 Green Drop results, the municipality should identify the key gaps in its water services delivery function and rectify those in a risk-based approach. If Lesedi applies focus and resources to these areas, it is possible to move its Green Drop score towards the 80% in the 2011/12 cycle.This expectation is supported by the excellent technical scores following the site inspection. The risk profile still reflects a negative trend towards an increased risk position, and would be rectified once adequate treatment capacity has been cleared or created and effluent quality improves.

Green Drop Findings:

1. Two of 2 treatment plants are not confirming to the requirements for monitoring and data credibility.Both plants exceed their hydraulic design capacity.
2. Botha plants are not meeting effluent quality limits, achieving a minimal of 20% compliance.
3. The updating of bylaws and implementation thereof, as well as the implementation of an Incident Management Protocol, remains a managerial priority.

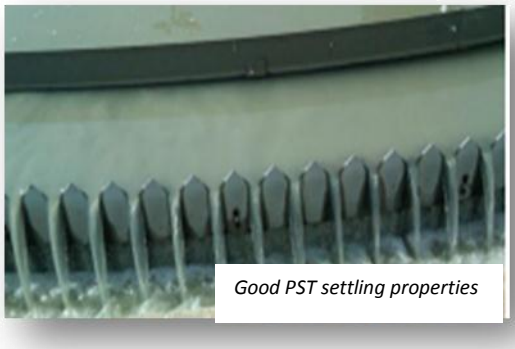
4. The lack of asset management remains an underlying component of sub-standard performance, and need to be rectified to address routine plant audits, asset registers, planning and financial ringfencing. A risk-based approach as part of asset management plan is advised.

Site Inspection Scores

Heidelberg	**85%**
Ratanda	**94%**

The following observations were made for Heidelberg:

- All documents, logbooks and procedures in place, with the exception of an O&M Manual – which was not transferred with the historic transfer of the plant
- Overall plant well maintained, pond area need attention, fence need to be upgraded and funds approved, limited gate control
- Good screening, grit classification, flow monitoring practices in place
- Good primary settling taking place, even overflow
- Activated sludge plant fully operational, bulking and scum formation evident
- Good quality overflow, disinfection well controlled.



Good PST settling properties

The following observations were made for the Ratanda plant:

Sludge drying beds well maintained

- The plant classification certificate, logbooks, manuals, emergency numbers and flow records and calibration certificates were in place
- The terrain was well maintained and offices clean with good furniture and staff facilities
- Occupational health and safety aspects are in place, with safety signs displayed in every building, a safety breathing mask in the disinfection room and emergency showers near the ferric chloride dosing facility
- The plant is fenced in with good security control
- Screening and conveyor assisted grit removal, with flow monitoring, are well maintained
- Good settling is taking place, all structures and equipment is operational, good quality effluent
- Activated sludge plant is well controlled with MLSS control. Operators use WRC literature to guide operational aspects
- Auto-controlled chlorination is in place with adequate stock, also used as washing water
- Sludge handling facilities need attention.

Water Services Authority: **Midvaal Local Municipality**

Municipal Green Drop Score: **53.5%**

Performance Area	*Systems*	Meyerton	OheniMuri	Vaal Marine
Process Control, Maintenance & Management skills		*43*	*75*	*35*
Monitoring Programme		*50*	*35*	*40*
Credibility of Sample Analyses		*85*	*70*	*78*
Submission of Results		*100*	*100*	*100*
Wastewater Quality Compliance		*15*	*10*	*10*
Failure Response Management		*39*	*28*	*28*
Bylaws		*100*	*100*	*100*
Treatment & Collector Capacity		*40*	*8*	*50*
Asset Management		*80*	*65*	*60*
Bonus Scores		66.25	0	0
Penalties		0.5	1	1
Green Drop Score (2011)		**56.8%** (↑)	**38.8%** (↑)	**39.1%** (↑)
Green Drop Score (2009)		16%	14%	14%
Treatment Capacity (Ml/d)		10	0.3	2
Operational % i.t.o. Capacity		170%	NI (assume >100%)	NI (assume >100%)
Cumulative Risk Rating (CRR)		18	11	12
% i.t.o. Maximum Risk Rating		78.3% (↑)	61.1% (↑)	66.7% (→)

NI - No information
NA- Not assessed

Regulatory Impression

The Midvaal Local Municipality has performed unsatisfactory the Green Drop assessments indicating that the wastewater services are not being managed according to the expectations of the regulation programme. A limited number of the Green Drop requirements are not met and result in an average overall municipal score of 53.5% for Midvaal. The municipality is to be commended for the significant improvement on the 2009 status, with high scores noted in areas such as data submission and credibility, as well as local bylaw enforcement. Unfortunately, the well performing areas in wastewater services are countered by the low scores for monitoring and compliance, failure response management and collector and treatment capacity. Notably, 2 plants are exceeding their capacity and the 3rd plant does not monitoring its incoming flows.

It is therefore the regulatory view that the Midvaal wastewater services continue to pose a significant risk to the receiving environment and public health, and that a concerted effort be applied to return to good practices on all aspects of the business. A negative trend is observed in the Cumulative Risk profile of Meyerton and OheniMuri, and the root causes must be addressed as a matter of priority.

Green Drop Findings:

1. Two out of 3 wastewater systems do not have the required staff, registrations and system specific documentation in place to administrate the systems according to legislative requirement and good practice.
2. Three of the 3 treatment plants do not meet monitoring requirements. This transgression also impacts on the compliance in terms of final effluent quality for all plants.
3. None of the 3 systems had incident management protocol for emergency or disaster events.

4. All three systems fall short of good practice in terms of collector and treatment capacity and asset management.
5. A risks-based approach is not evident, and might assist the municipality to follow a prioritised approach, whereby the most urgent aspects are dealt with firstly.

Site Inspection Scores

Meyerton	**41%**
Vaal Marine	**47%**

The following observations were made for the Meyerton plant:

- Plant deserted with the exception of a 'supervisor' – low knowledge base and negative approach to work place and job responsibilities
- No manuals, testing apparatus or logbooks in place
- Inlet works in working condition, with new screen fitted. Grit removal and flow metering taking place
- Primary sedimentation tank decommissioned for upgrades. Previous contractor dismissed for poor quality work
- Activated sludge plant operational, but specific mechanical and operational inefficiencies
- Poor settling, sludge build up, no disinfection due to high TSS discharge from clarifiers
- Sludge drying beds compromised by high water content.

Refurbishment of PST after sub-standard work by previous contractor

Heavy scum formation and sludge accumulation in SCT with high solids carry-over

Findings for the Vaal Marine plant were as follows:

- Site is in reasonable condition, fenced and gated, earthworks left unfilled, sludge spillage
- Screen and grit removal adequate, new flow meter installed but not monitored
- Good use of balancing tank, low organic load to plant
- Activated sludge plant functional, mechanical equipment under repair
- Poor sludge settling in secondary clarification
- Disinfection in place, no monitoring of free residual chlorine
- Sludge drying beds functional.

Diluted low COD inflow to plant

Water Services Authority:	**Mogale City Local Municipality**

Municipal Green Drop Score: **66.7%**

Performance Area	*Systems*	**Percy Stewart**	**Flip Human**	**Magaliesburg**
Process Control, Maintenance & Management skills		***90***	***90***	***85***
Monitoring Programme		***100***	***100***	***30***
Credibility of Sample Analyses		***91***	***91***	***61***
Submission of Results		***50***	***75***	***0***
Wastewater Quality Compliance		***20***	***20***	***0***
Failure Response Management		***45***	***88.8***	***45***
Bylaws		***100***	***100***	***100***
Treatment & Collector Capacity		***100***	***100***	***100***
Asset Management		***55***	***65***	***25***
Bonus Scores		25	25	0
Penalties		0	0	0
Green Drop Score (2011)		**62.3% (↓)**	**69.4% (↑)**	**37.8% (↑)**
Green Drop Score (2009)		36%	36%	36%
Treatment Capacity (Ml/d)		24	50	1.1
Operational % i.t.o. Capacity		67%	52%	27%
Cumulative Risk Rating (CRR)		20	20	13
% i.t.o. Maximum Risk Rating		**71.4% (↑)**	**71.4% (↑)**	**72.2% (↑)**

NI - No information *NA- Not assessed*

Regulatory Impression

The Mogale City Local Municipality has performed unsatisfactory during the Green Drop assessments indicating that the wastewater services are not being managed according to the expectations of the regulation programme. The Green Drop requirements are largely not met and result in a low overall municipal score for Mogale (66.7%). Despite having well designed plants, adequate hydraulic capacity and high expenditure ratios, the plants are in a dire state - as verified by the technical inspections. The wastewater services are marked by fairly good documentation and scientific laboratory being place, but plant management, operation and maintenance deficiencies are eminent causes for the underlying inadequate performance. It is evident that the root cause of continued non-compliance be rectified, as funds alone will not result in a sustainable turnaround in municipal sanitation services.

A point of reference for Mogale City leadership would be the reminder the 2 Mogale plants received national awards from the Water Institute of Southern Africa a few years ago. The Magaliesburg plant is a state of the art (new) plant commissioned in the mid 2000's, but is now out of operation. The Flip Human plant is not only particularly well design with various process options, but receives only 52% of the design capacity's flow. The vast amounts of funds expended over the past two years are still to provide evidence of its useful application as poor effluent quality continues to be discharged from all plants. This present a negative picture for local governance that needs to be addressed without delay.

The situation in Mogale City is considered critical from a regulatory view and holds high risk to public health and the environment. All plants are already in **high risk** positions, and continue to increase into a critical risk space. Regulatory focus will be increased to ensure that the continued non-compliance within a sensitive catchment, is addressed with added urgency.

Green Drop Findings:

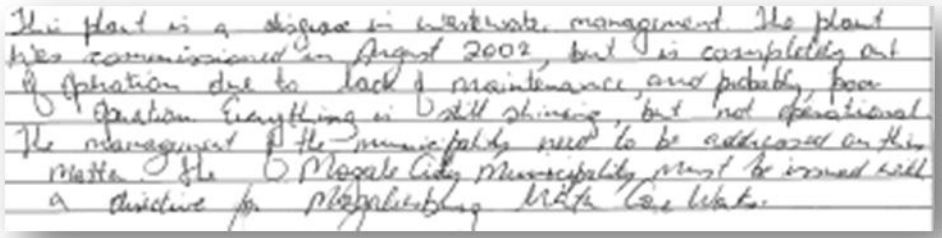
1. Three out of 3 wastewater treatment plants have adequate hydraulic capacity, but poor compliance to effluent quality limits.
2. None of the 3 systems conform to the legal requirement pertaining to submission of results
3. One of 3 systems does not have incident management protocol in place, nor are these implemented adequately, when taken in context of the City's emerging disaster areas.
4. Lastly, the absence of a risk-based approach and adoption of integrated asset management principles, result in good infrastructure not being valued and maintained to extend it useful lifespan. This is bound to place an additional burden on the municipal budget when premature replacements will have to be done to ensure an acceptable service level.

Site Inspection Scores

Magaliesbrug	**33%**
Flip Human	**52%**
Percy Steward	**63%**

The following findings are reported for the Magaliesburg plant:

- Despite good design and being a new plant, this facility is defunct as result of poor maintenance and operation. Poor workplace satisfaction is noted
- Screening and flow monitoring in place, poor handling of solids, adequate grit removal
- The activated sludge plant, clarification and disinfection are decommissioned due to lack of maintenance and operation. Effluent is diverted to sludge dams and discharged to land.
- The assessment panel summarised the general state of the plant as follows:



The following findings were reported for Flip Human plant:

- Overall appearance of the plant is fair, structures in good condition, paint work needs attention, good fencing but poor gate control
- Laboratory on site, slow transfer of data between scientific- and operations staff problematic
- Satisfactory workplace conditions, good facilities for workers
- Screening, grit removal and flow metering in place, some equipment not functional
- Two of 4 primary settling tanks out of commission, poor maintenance evident
- Seven out of 15 aerators not working on main activated sludge plant
- Two additional activated sludge modules decommissioned, as result of low flow
- Secondary clarifiers have 2 out of 3 motors removed for repairs, poor baffle condition, good settling still evident. No disinfection taking place
- Poor process control of anaerobic digesters and biogas facility is not functional.

The observations for the Percy Stewart plant are as follows:

- The plant's general appearance is fair, but evidence of fat dumps and sludge spillage
- Manuals and certification in place, but not operational logbooks, long leadtime between analysis and effecting operational changes on the plant
- Inlet works is well maintained with good screening, flow metering and grit removal
- Three out of 14 biofilters decommissioned, but activated sludge plant is functioning well
- Poor settling - sludge carryover on secondary clarifiers, no disinfection, poor effluent quality.

Water Services Authority:	**Nokeng Tsa Taemane Local Municipality**

Municipal Green Drop Score: **70.5%**

Performance Area	*Systems*	Rayton	Refilwe
Process Control, Maintenance & Management skills		***100***	***85***
Monitoring Programme		***75***	***75***
Credibility of Sample Analyses		***70***	***70***
Submission of Results		***100***	***100***
Wastewater Quality Compliance		***0***	***38***
Failure Response Management		***66.3***	***66.3***
Bylaws		***55***	***55***
Treatment & Collector Capacity		***85***	***85***
Asset Management		***52.5***	***62.5***
Bonus Scores		100	100
Penalties		1	0
Green Drop Score (2011)		**60.8(↑)**	**74.2% (↑)**
Green Drop Score (2009)		44%	44%
Treatment Capacity (Ml/d)		0.6	1.6
Operational % i.t.o. Capacity		100%	139%
Cumulative Risk Rating (CRR)		8	8
% i.t.o. Maximum Risk Rating		**44.4% (↓)**	**44.4% (↑)**

NI - No information
NA- Not assessed

Regulatory Impression

The Nokeng Tsa Taemane Local Municipality performance improved vastly from the 2009 Green Drop status. The overall municipal score of 70.5% indicates that the wastewater services are still not meeting regulatory requirements, but are moving into a position of strength, with a promising future for wastewater services in short term future. The key short comings are found in the monitoring, compliance to effluent quality standards, lack of bylaw enforcement, and asset management. Both plants have reached or exceeded their hydraulic design capacity and it is encouraging to note that both plants are being upgraded in rectification of this shortcoming. However, one of the root causes of overloading seems to be by way of stormwater ingress and water losses, which is not addressed at the current time, and would result in artificial high volumetric- and low COD loading of the plants.

From the 2010/11 Green Drop results, it is possible for the municipality to identify the key gaps in its water services delivery function and to rectify those in a risk-based approach. If Nokeng could apply focus and resources to these areas, it is possible to move its Green Drop score towards >80% in the GDC 2011/12 cycle. The increased risk profile of Refilwe (↑) indicates that improvement in plant capacity and effluent quality is required, but for now both plants reside in low risk space.

Green Drop Findings:

1. Two of 2 treatment plant are not confirming to the requirements for monitoring and data credibility.
2. Two of 2 plants are not meeting effluent quality compliance.
3. Both plants are at- or exceeding their design capacity.

4. The updating of bylaws and implementation thereof, as well as the implementation of an Incident Management Protocol, remains a managerial priority.
5. Asset management remains an underlying component of sub-standard performance, and this aspect need to be rectified to address routine plant audits, implementation of audit recommendations, asset registers, planning, financial ringfencing and pumpstation maintenance in particular. A risks-based approach as part of asset management plan is advised.

Site Inspection Scores

Rayton	**63%**
Refilwe	**72%**

The following findings are reported for the Rayton and Refliwe plant:

- The plants are reliant on an external services provider for plant operation and maintenance
- Plant classification, contact numbers and limited logbooks kept on site, no manual kept on site
- Neat premises and good housekeeping, good workplace satisfaction
- Inlet works is well maintained, good screening and grit removal
- At Rayton, the flow meter has been broken for 6 months without replacement – high stormwater infiltration during rain events. At Refilwe, flow logging in place
- Activated sludge plant and clarification functional, operational measures not recorded
- Disinfection facility operational with adequate chlorine gas stock and back-up HTH
- Drying beds structurally good but valves vandalised in the case of Rayton– for urgent repairs
- At Refilwe, sludge used as conditioner and removed by external contractor – conformance to sludge guidelines and classification not in place.

Water Services Authority: **Randfontein Local Municipality**

Municipal Green Drop Score: **80.4%**

Performance Area	*Systems*	**Randfontein**
Process Control, Maintenance & Management skills		***85***
Monitoring Programme		***70***
Credibility of Sample Analyses		***100***
Submission of Results		***100***
Wastewater Quality Compliance		***88***
Failure Response Management		***0***
Bylaws		***100***
Treatment & Collector Capacity		***100***
Asset Management		***90***
Bonus Scores		0
Penalties		0
Green Drop Score (2011)		**80.4%** (↑)
Green Drop Score (2009)		66%
Treatment Capacity (Ml/d)		19.5
Operational % i.t.o. Capacity		NI (assume >100%)
Cumulative Risk Rating (CRR)		13
% i.t.o. Maximum Risk Rating		56.5% (↑)

NI - No information
NA- Not assessed

Regulatory Impression

The Randfontein Local Municipality performed on satisfactory and improved on the 2009 Green Drop status. The overall municipal score of 80.4% indicates that the wastewater services are moving into a position of strength. The key short comings are found in the technical staff component, monitoring, compliance to effluent quality standards and lack of incident management protocols. No flow monitoring evidence could be provided, as is an essential element of good practice. A committed team is in place, reliant on an external services provider, with good communication channels.

From the 2010/11 Green Drop results, it is possible for the municipality to identify the key gaps in its water services delivery function and to rectify those in a risk-based approach. The municipality has already commenced with risk assessments as part of the Hartbeespoortdam catchment targeted programme. If Randfontein could apply focus and resources to these areas, it is possible to move its Green Drop score towards 90% in the GDC 2011/12 cycle. Despite a positive trend for the overall wastewater business, the risk profile that assesses the specific status of the treatment facility still shows an increased risk CRR that need to be rectified before the plant move into high risk space.

Green Drop Findings:

1. One of 1 treatment plant are not confirming to the requirements for comprehensive monitoring. This transgression includes the lack of flow monitoring.
2. The treatment plant is not meeting effluent quality compliance.
3. The development and implementation of an Incident Management Protocol, remains a managerial priority.

4. Asset management remains an underlying component of sub-standard performance, and this aspect need to be rectified to address routine plant audits, implementation of audit recommendations, asset registers, planning, financial ringfencing and pumpstation maintenance in particular. A risk-based approach as part of asset management plan is advised.

Site Inspection Score

Randfontein 72%

The following findings are reported for the Randfontein plant:

- The plant classification and staff registration certificates, as well as all manual, protocol and logbooks are available and accessible
- A comprehensive on-site operational kit and data logging in place
- Plant is well maintained, but old rubble and site clearing need to be done, as well as necessary paint works. Tidiness can be improved on both the terrain and in buildings
- Screening and grit removal in place but site not well kept and cleaned
- Inflow and outflow streams monitoring and recorded
- Both primary and secondary settling well operated and maintained
- Activated sludge aerators and mixers not fully functional, good operational control
- Disinfection takes place, but may be compromised by sludge in contact channel that would increase the chlorine demand unnecessarily
- Sludge handling are not according to good practice, with both the condition of the sludge drying beds needing attention, and anaerobic digesters processes to be reinstated.

Water Services Authority:	**Westonaria Local Municipality**

Municipal Green Drop Score: **56.8%**

Performance Area	*Systems*	**Hannes van Niekerk**
Process Control, Maintenance & Management skills		**82.5**
Monitoring Programme		**75**
Credibility of Sample Analyses		**100**
Submission of Results		**75**
Wastewater Quality Compliance		**0**
Failure Response Management		**55**
Bylaws		**20**
Treatment & Collector Capacity		**92.5**
Asset Management		**57.5**
Bonus Scores		52.5
Penalties		0
Green Drop Score (2011)		**56.8% (↑)**
Green Drop Score (2009)		30%
Treatment Capacity (Ml/d)		30
Operational % i.t.o. Capacity		130%
Cumulative Risk Rating (CRR)		16
% i.t.o. Maximum Risk Rating		**57.1% (↑)**

NI - No information
NA- Not assessed

Regulatory Impression

The Westonaria Local Municipality has performed unsatisfactory, indicating that wastewater services are not in fulfilment of the expectations of the regulation programme. The Green Drop requirements are largely not met and result in an overall municipal score for Westonaria (56.8%).Wastewater service delivery shortcomings are evident in terms of the low scores for monitoring, compliance to effluent standards, failure response management, bylaw enforcement and asset management. In addition, the plant is hydraulically overloaded, but plans are in place to address this. Unfortunately, such plans do not prioritise the reduction of extraneous flow load to the sewer collection and treatment systems. Preventative pumpstation maintenance and scheduled inspections are a major concern in terms of wastewater management, and represents a major hazard in the Westonaria area.
A positive trend is observed in terms of the improved Green Drop scores (↑), however, the treatment facility still continues along an increased risk pattern (↑), which must be addressed without delay. A major element of this higher risk value is the overloading of the treatment facility.

Green Drop Findings:

1. One out of 1wastewater systems can improve on its technical and managerial skills base and related administration.
2. One of 1 treatment system does not have the required monitoring and results submission practices in hand.
3. Zero percent compliant to effluent quality standards are compounded by the lack of failure management protocol, in typical cases of emergencies – as has been experienced by the municipality.

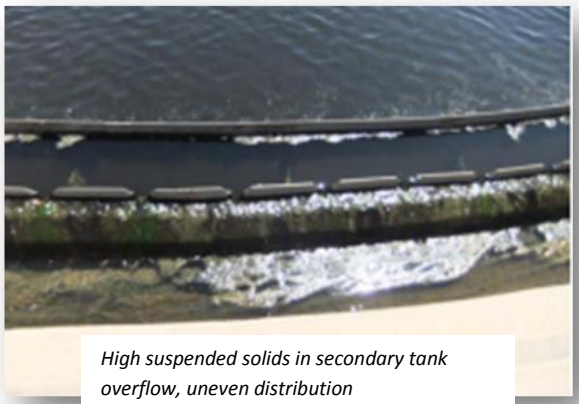
4. None of systems have adequate bylaws or implementation thereof in place, which also compromises the financial sustainability of the municipality.
5. Lastly, the absence of a risk-based approach and adoption of integrated asset management principles, result in good infrastructure not being valued and maintained to extend it useful lifespan. This is bound to place an additional burden on the municipal budget when premature replacements or reactive maintenance will have to be done to ensure an acceptable service level.

Site Inspection Score

Hannes van Niekerk 64%

The following findings are reported for the Hannes van Niekerk plant:

- Limited information and logsheets were found at the plant. Manuals are in place
- Plant appearances are reasonably neat, good facilities for management, facilities for workers need attention
- Workers not busy at work during workhours when inspection was conducted
- Screening functional, but manual screens poor design. Grit classifiers and pumps well operated but volumes not recorded. Three flow meters operational
- Biofilters recently refurbished but not in use, staff claim this decision is due to low flow – all flow to activated sludge plant. (note the contradiction, when considering 130% hydraulic overload of plant)



High suspended solids in secondary tank overflow, uneven distribution

- Activated sludge plant shows bulking, process control in place but data not optimally used, despite a knowledgeable plant manage
- Assessor note: "*some of the equipment at the new plant was not operational, SCADA not functional*"
- Secondary clarification functional but sludge carryover, especially where short circuiting and algae growth not removed
- Poor disinfection control, high suspended solids increase the chlorine demand unnecessarily
- Poor sludge handling although facilities are available in terms of drying beds and line pond systems

Sludge ponds with design and operational challenges

- Maturation ponds reported to have plunged with sinkhole formation. Contingency measures for such critical hazards and risks must be put in place as part of the municipality's Risk Abatement Plan.