

**IMPLEMENTATION
OF THE
INTEGRATED WATER QUALITY MANAGEMENT
STRATEGY
FOR THE
VAAL RIVER SYSTEM**

(WATER QUALITY MANAGEMENT REPORT BY: J.J. VAN WYK)

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Water Affairs
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1. DOCUMENT PURPOSE

The purpose of the document is to-

- provide written report-back to the Vaal River Strategy Steering Committee in respect of the implementation of the Integrated Water Quality Management Strategy for the Vaal River System (see locality map appended in *Appendix A*)

2. ABBREVIATED SCOPE OF THE STRATEGY

The Vaal River Integrated Water Quality Management Strategy is being rolled-out for the inter-dependant water resource systems of the Upper, Middle and Lower Vaal Water Management Areas (WMAs) and the associated Modder-Riet Catchment [DWA, 2009b], and aims to achieve the following:

- Maintaining or improving the water quality of the water resources within the System for the benefit of all recognized water users and beneficial water uses in order to assist in securing ecologically sustainable development, while also promoting justifiable social and economic development;
- Managing the water resources of the System in order to comply with the determined integrated Resource Water Quality Objectives (RWQOs). The said RWQOs are to constitute the basis for the management of the water quality of the System;
- Controlling the salinity, eutrophication and microbiological contamination levels in the main stem, and major tributaries, as the key water quality issues identified;
- Improving source management controls and measures as a means to limit and control point and diffuse sources that significantly impact on the water resources of the System; and
- Improving management of the water resources of the System by more effective monitoring, assessment, reporting and management participation.

3. STRATEGY FOCUS AREAS

Water quality issues had been identified during a water quality status assessment of the Vaal River System [DWA, 2009a]. All the identified issues have been grouped into four focus areas; these being-

- salinity;
- eutrophication;
- microbiological pollution; and
- institutional challenges.

The Vaal River Integrated Water Quality Management Strategy is structured such that each of these focus-areas receives explicit attention.

4. STRATEGY MATRIX

A synopsis of the Vaal River Integrated Water Quality Management Strategy [DWA, 2009b] with additions where necessary, is given in *Appendix B*. The purpose of *Appendix B* is to assign responsibility and to report progress on key elements of the integrated strategy.

5. PROGRESS ON SELECTED ACTIONS

The following key actions are singled out for reporting here:

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- **Salinity Modelling:**
- Golder & Associates was appointed to assist the Department with a study aimed at the calibration of the WQT Salinity Model for the Orange River System and integration with the Water Resource Planning Model (WRPM) in order to enable integrated salinity management in the Vaal and Orange River Systems.
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- **Integrated Management:**
- A Terms of Reference is currently being finalised to initiate a study to establish an Integrated Water Quality Management Strategy for the Upper and Lower Orange Water Management Areas.
 - The aim, *inter alia*, is to integrate the said strategy with the Integrated Water Quality Management Strategy that had been established in 2009 for the Vaal River System,
 - In order to ensure effective integration, this study, the *Salinity Modelling* study described immediately above and the *Reconciliation Strategy* for the Orange River, to be established by the Directorate National Water Resource Planning, all need to be conducted in parallel, potentially with a single Project Steering Committee.
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- **Coal Mining:**
- It is planned to investigate the application of lessons-learned in the Upper Olifants River Basin to the Upper Vaal WMA, specifically in order to manage and curb the expected adverse mining impacts that are likely to manifest should pro-active interventions not be implemented timeously in order to protect the strategically important water resources of the Upper Vaal WMA.
 - Study inception is planned for the first quarter of the 2011/12 financial year.
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- **Acid Mine Drainage:**
- One of the recommendations of the Team of Experts, as accepted by Cabinet, stated that in the medium- to long-term consideration should be given to steps which will reduce the mine water contribution to the salinity of major river systems and that the necessary feasibility studies will need to be initiated immediately.
 - The appointment of the preferred bidder to assist with the said feasibility study is imminent.
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- **Waste Discharge Charge System (WDCS)**
- Appointment of the preferred bidder to initiate pilot studies for the Vaal, Crocodile (West)-Marico and Olifants Water Management Areas is imminent.
 - One of the outputs of the study will be to produce waste discharge charges applicable to each of the said WMAs.
 - Study inception is planned for the first quarter of the 2011/12 financial year.
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- **Waste discharge standards**
- Uniform waste discharge standards are currently being devised to address the waste water quality requirements of end-of-pipe discharges.
 - An attempt is made to link the standards to generic receiving water quality requirements, as well as to what is reasonably achievable through the application of available technology.
 - The standards are about to be gazetted for comment.
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- **Mine water management**
- The preferred bidder was appointed to update Government Notice 704 to improve the general management of mining impacts on water.
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- **General Authorisations**
- A process to revise the General Authorisations for waste discharge and disposal related water uses has been initiated.
 - The General Authorisations are to be gazetted for comment.
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- **Agriculture**
- A series of Best Practice Guideline document for Agriculture are being finalised. These include a *Literature review*, a *Situation assessment* report, a *Communication framework*, an *introduction to Eutrophication prevention, management and control*, an *Operational guideline to develop catchment eutrophication management strategies*, an *Operational guideline for best eutrophication management practices*, a *Strategy*, an *Operating procedures manual*, and a *Winery waste water strategy*.
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- **Waste Water Treatment**
- A guideline for operating package plants had recently been finalised.
 - Regulations to regulate package plants is currently being reviewed by DWA Legal Services (2nd round) and the Chief State Advisor.
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6. FUNCTIONAL INTEGRATION

As there are various departmental role-players designated to fulfil different, but supporting functions that collectively make up Water Quality Management in the Department, the challenge, firstly, in the Vaal River System is to ensure that all these efforts are directed towards common goals in a coordinated fashion. As such, a Vaal River Integrated Water Quality Management Strategy Implementation Committee (VWQIC) is in the process of being established. The purpose of the VWQIC will be to-

- highlight water quality matters in relation to the mandate and responsibility of each of the committee members identified;
- ensure coordination between the various components in DWA at both Head Office and Regional Office level, with the aim of giving effect to the Vaal River Integrated Water Quality Management Strategy;
- ensure coordination of actions throughout the catchments and sub catchments of the Vaal River Basin in respect of water quality management;
- ensure the identification and implementation of actions to assist with integrated water quality management in the Vaal River Basin;
- allow for the updating of the Vaal River Integrated Water Quality Management Strategy, where appropriate; and
- ensure accurate and efficient feedback with regard to the implementation of the abovementioned actions to the VWQIC and the Vaal River SSC.

Committee members will initially be selected from within DWA with invitations for extra-departmental participation to follow thereafter.

7. CONCLUSION

Effective water quality management constitutes a prerequisite for sustainable development and growth in the supply area of the Vaal River System. Implementation of the strategy needs to be effected in an iterative fashion focusing on priority issues first.

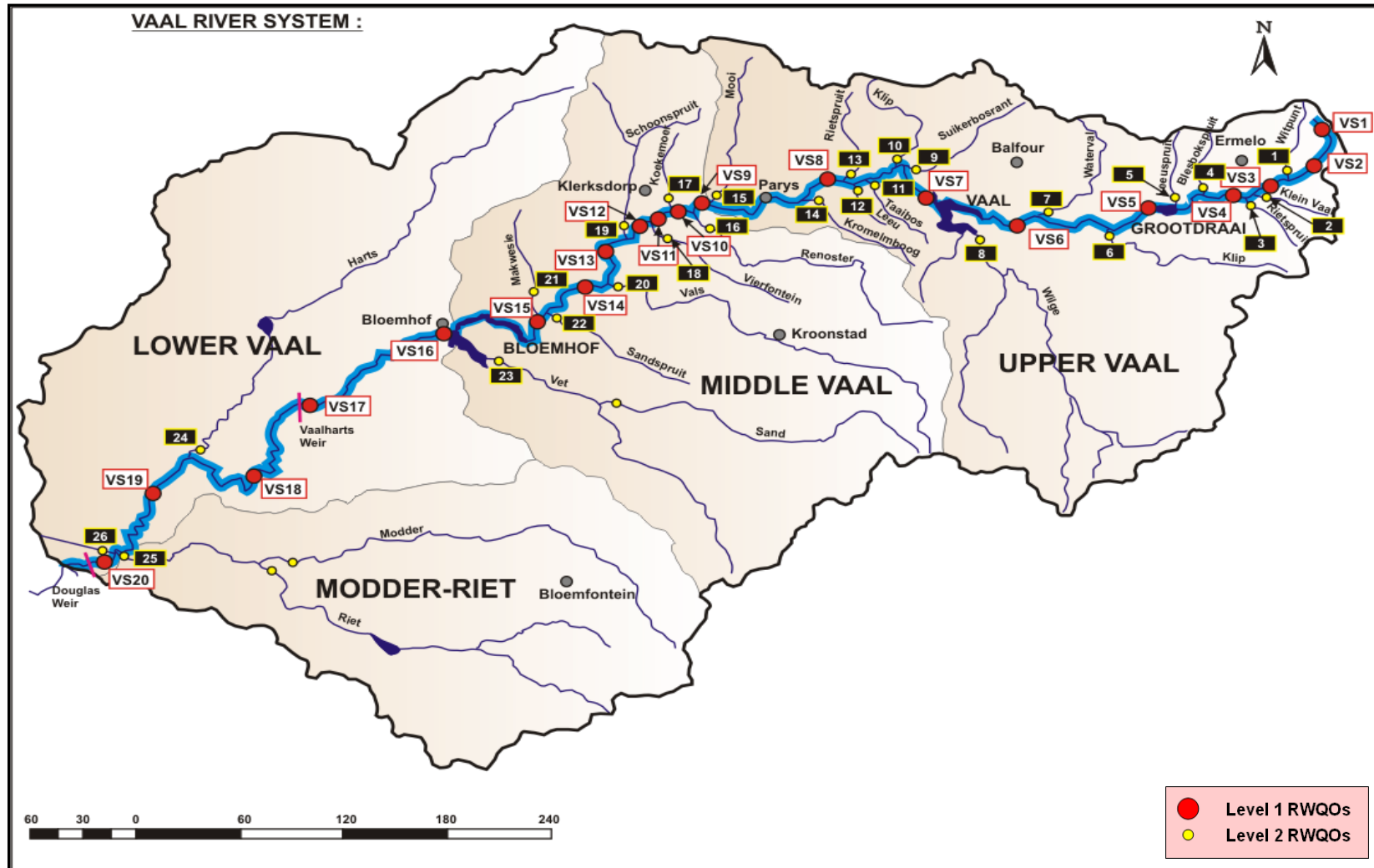
8. REFERENCES

Department of Water Affairs, South Africa (DWA), 2009a. Directorate National Water Resource Planning: *INTEGRATED WATER QUALITY MANAGEMENT PLAN FOR THE VAAL RIVER SYSTEM: **Task 2: Water Quality Status Assessment of the Vaal River System.*** Report Number: P RSA C000/00/2305/1.

DWA, 2009b. Directorate National Water Resource Planning: *INTEGRATED WATER QUALITY MANAGEMENT PLAN FOR THE VAAL RIVER SYSTEM: **Water Quality Management Strategy.*** Report Number: P RSA C000/00/2305/7.

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APPENDIX A LOCALITY MAP



APPENDIX B

STRATEGY MATRIX

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
1. Salinity	1.1 The current salinity status in the Vaal Dam and Grootdraai Dam Catchments should be maintained. This will involve careful and diligent management of the upstream mining activities, in particular post closure.	1.1.1 Exploratory discussions are being held with the Regional Office on aspects relating to pro-active planning in respect of mining in the sub-region. A planning study needs to be commissioned to pro-actively address the potential adverse impacts of coal mining in the Grootdraai Dam Catchment and catchments associated with strategic transfers to the Upper Vaal River System. This would include the Calibration and updating of hydrology and the inclusion of the coal mines in the hydrology calibration; the calibration of WQT for sulphate to include the mines; and the updating and application of the WRPM to assess water quality management strategies.	WRPS:WQP (and Gauteng Regional Office)	Busy (Study to be advertised in the Tender Bulletin during the 1 st quarter of the 2011/12 financial year)
		1.1.2 Implementation of the to-be-established “coal mining strategy”/ “salinity management strategy”.	Gauteng Regional Office (and RPW)	The strategy needs to be completed first

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	<p>1.2 The short term strategy for the middle reaches from Vaal Barrage to Bloemhof Dam is to implement Scenario 1a, <i>i.e.</i> the release of dilution water from Vaal Dam to dilute the outflow from the Vaal Barrage to 600 mg/l.</p> <p>The implementation of this scenario does not meet the initial set of Resource Water Quality Objectives (RWQOs) set for the Vaal River main stem, but does result in an improvement in the water quality in the middle reaches of the Vaal River. The water users will incur economic dis-benefits due to the salinity levels and a waste discharge charge should be used to compensate for these dis-benefits.</p>	<p>1.2.1 The short term strategy as per Scenario 1a should be implemented <i>i.e.</i> the releases of dilution water should continue to be released from Vaal Dam to maintain the outflow from the Vaal Barrage at 600 mg/l</p>	Gauteng Regional Office (and WRPS:SO)	Ongoing (The 600 mg/l operating rule is being implemented)
		<p>1.2.2 The waste discharge charge system (WDCS) is an important component of the water quality management strategy. The charge is proposed to compensate the middle Vaal water users and will be used to change behaviour or raise money to treat the selected saline streams. Progress has been made in formulating the waste discharge charge system. The system is to be piloted on the Vaal River System by the Department. The pilot WDCS study still needs to take place to set the foundations for the implementation of the system in the Vaal River. This study needs to take place.</p>	RPW (and Gauteng Regional Office)	Busy (Professional Service Providers (PSPs) are about to be appointed)
		<p>1.2.3 The findings of the WDCS pilot project on the Vaal River System must be implemented on a permanent basis.</p>	Gauteng, Free State & Northern Cape Regional Offices (and RPW)	Awaiting WDCS
	<p>1.3 The release of Vaal Dam dilution water is feasible until 2014, after which excess water will accumulate in Bloemhof Dam. By 2014, a plan to use the excess water needs to have been developed. The plan could be to support the lower Orange from Bloemhof Dam, transfer to the Crocodile West catchment or treat and re-use in the Vaal River System. The use of the excess water, which includes the saline mine water streams should be the subject of a feasibility study.</p>	<p>1.3.1 A reconnaissance investigation is required to determine how the excess water is best utilized. This study will investigate transfers to the Crocodile West catchment, treatment and reuse of mine and industrial effluent, and support to the lower Orange River.</p>	NWRP	Completed
		<p>1.3.2 The feasibility study for the West, Central and East Rand underground mining basins is required to determine the management strategy for the excess mine water. The study will incorporate mine planning, the latest treatment technologies, design, costing, institutional and funding mechanisms for the schemes.</p>	WRPS:WQP	Busy (PSPs are about to be appointed)
		<p>1.3.3 "Re-watering Strategies" need to be established for the other underground gold and coal mining basins as well.</p>	WRPS:WQP	Will follow 1.3.2

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	<p>1.4 The short term RWQOs for the Vaal River main stem and for the tributaries should be established and compliance monitoring reported against the RWQOs. The tributary catchments must be managed to meet the RWQOs established at the downstream point of the catchment.</p>	<p>1.4.1 The set of RWQOs that are proposed in this study for the main stem of the Vaal River and the major tributaries need to be accepted by the Catchment Forums and stakeholders, and implemented. Compliance reporting needs to be done against the RWQO and the implementation of the short term strategy measured against the RWQO.</p>	<p>Gauteng, Free State & Northern Cape Regional Offices (and RQS & WRPS:WQP)</p>	<p>Ongoing</p> <p>(Free State Regional Office is being assisted with the determination of low confidence Level 3 RWQOs for the Sand-Vet, Schoon-Koek & Modder-Riet Systems. Presentation of RWQOs to stakeholders is scheduled for November 2011)</p> <p>(Monitoring needs are being communicated to the Regional Offices and to RQS)</p>
		<p>1.4.2 The Department must continue with licensing, the development of Integrated Waste and Water Management Plans and participation in EIA/ EMP processes. This will ensure that the various strategies of the Department are implemented and the Department has a say in the water management of mines and industries. The set of RWQOs can be used in setting up the licence conditions for discharges.</p>	<p>Gauteng, Free State & Northern Cape Regional Offices (and RPW)</p>	<p>Ongoing</p> <p>(Project Letsema addressing the licensing back-log)</p>
		<p>1.5.1 The improved monitoring program requires the installation of continuous monitoring equipment at key stations in the system as well as expanding the current grab sampling program. This program needs to be implemented as soon as possible. The monitoring program has been developed to include compliance monitoring so that the effectiveness of the short term strategy can be monitored.</p>	<p>RQS and Gauteng, Free State & Northern Cape Regional Offices</p>	<p>Ongoing</p> <p>(Initial discussions were held with RQS. The matter is to be facilitated through the Vaal River Integrated Water Quality Management Strategy Implementation Committee (VWQIC))</p>
<p>1.5 The current water quality monitoring program must be expanded, according to the monitoring program developed and detailed in the Task 7 Report produced as part of the IWQM Strategy study.</p>				

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ	
	1.6	The planning and engineering design of the next Vaal River System augmentation scheme should be completed. The water quality of the water proposed for transfer should be considered in the final selection of the augmentation scheme.	1.6.1 The necessary studies should be undertaken to select the next augmentation scheme. Once the scheme has been selected the designs should be completed so that the scheme is ready for implementation once clarity on the augmentation date is available.	OA (and WRIB)	Busy (OA to report progress)
	1.7	The impact of the salinity management strategy selected for the Vaal River on the Orange River must be investigated. Before a final decision is made, consideration must be given to the water quality impact on the Lower Orange River of the preferred management option and the RWQOs established. The impact of the releases to support the Lower Orange River reaches on water quality needs to be investigated as well as the impact of the next augmentation scheme.	1.7.1 Calibration of the WQT Salinity Model for the Orange River System and integration with the Vaal River Planning Model (VRPM).	WRPS:WQP	Busy (Golder & Associates was appointed. Study inception is planned for the 1 st quarter of the 2011/12 financial year.)
			1.7.2 The projects resulting from the feasibility study will need to be implemented. The projects could include the construction of desalination plants and supply infrastructure for treatment and re-use of mine and industrial effluent and transferring excess water for use in the Crocodile West catchment	OA	Awaiting results from the Feasibility Study, as per 1.3
2. Nutrients	2.1	The Waterval Catchment Management Strategy developed by the Department needs to be implemented.	2.1.1 The strategy, <i>inter alia</i> , includes the improved management of the wastewater treatment works to meet the phosphorus RWQO set for the Waterval River. This will reduce the nutrient loads reporting to Vaal Dam and should protect the trophic status of Vaal Dam.	Gauteng Regional Office	Busy

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	<p>2.2 Flow manipulation along the Middle Vaal during the months of September through October will be used to manage the risk of algal blooms in the middle reaches of the Vaal River from Vaal Barrage to Bloemhof Dam in the short term. The Vaal Dam release will be piloted, the impacts monitored and the release protocols documented. This will involve the release of water from the Vaal Barrage (augmented from Vaal Dam) to reduce residence times and improve mixing. The initial release proposed is-</p> <p>Base flow 15 m³/s for 28 days - giving a total release volume of 36.3 million m³; and 100 m³/s for 48 hours - giving a total release volume of 17.3 million m³. Total of 53.6 million m³ will be released during the annual flow manipulation program. The flow manipulation recommended will be considered with the Reserve scenarios to ensure the alignment to the ecological water requirements.</p>	<p>2.2.1 The flow manipulation will be piloted to determine its effectiveness in controlling algal blooms. The pilot will be used to provide input to the protocols for the releases to be applied in the short term to manage the trophic conditions in the middle reaches of the Vaal River.</p>	<p>WRPS:WQP</p>	<p>Terms of Reference (ToR) was not approved (2010-05-10). A revised ToR will be submitted in the 2011/12 financial year.</p>

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	<p>2.3 Phosphorus has been selected as the limiting nutrient for the management of Eutrophication in the Vaal River System. A set of RWQOs for phosphorus was developed for the main stem of the Vaal River. The proposed RWQOs are based on an analysis of the available nutrient and algal database.</p>	<p>2.3.1 The Department must continue to use licensing as the tool to achieve the RWQOs set for the Vaal main stem. The licence conditions will be drawn from the phosphorus reduction program and nutrient balance modeling.</p>	Gauteng, Free State & Northern Cape Regional Offices (and RPW)	<p>Ongoing</p> <p>(Project Letsema addressing the licensing back-log)</p>
	<p>2.4 The operations and maintenance (O&M) of many of the wastewater treatment works are poor and poor quality effluents are discharged. In many cases, the treatment plants are not able to handle the hydraulic or the organic loads. As a result, the installed treatment technology is not always working to specification. An audit of the wastewater treatment works, especially draining to the Vaal Barrage, is required to determine the works that are not working to specification and develop a program to retrofit and upgrade these works. It is essential to address the issue of insufficient O&M resources in this process.</p>	<p>2.4.1 The wastewater treatment works identified by the Department's Regional Offices that are not meeting licence conditions and are not functioning to specification should be listed. The works should be audited, repairs and retrofitting required determined and a program agreed with the local municipalities to implement the work.</p>	Gauteng, Free State & Northern Cape Regional Offices (and WSR & Local Government)	<p>Busy</p> <p>(It is foreseen that the establishment of the VWQIC will assist in co-ordinating efforts.)</p>
		<p>2.4.2 The wastewater treatment plant upgrades and retrofitting planned during the planning and feasibility study should be implemented.</p>	Local Government (and Gauteng, Free State & Northern Cape Regional Offices)	<p>Busy</p>

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	<p>2.5 The medium to long term strategy will be the further management of phosphorus by reducing the load discharged from point sources. A better understanding of the nutrient balance in the Vaal Barrage and the Vaal River main stem from the Vaal Barrage to Bloemhof Dam is required, before revised discharge standards can be set. A nutrient balance study is therefore proposed which will result in a better understanding of the sources and fate of nutrients (phosphorus and nitrogen) and will provide the rationale for revising the current 1 mg/l phosphorus discharge standard.</p>	<p>2.5.1 The monitoring required to better understand the nutrient balance will be implemented as part of the monitoring program. The data collected should be used to better understand the nutrient balance and should be used to set up a planning level model for phosphorus. The idea being to apply the model to develop a nutrient management strategy and to determine the phosphorus discharge standard. The economics of Eutrophication will be used in setting of the discharge standard. The results will be used to develop a phosphorus reduction program which will result in achieving the RWQO for phosphorus. The use of phosphorus free soaps and detergents will be considered as part of the program.</p>	WRPS:WQP	<p>Funding was not approved and the study stopped.</p> <p>(Need to re-start the procurement process to obtain the assistance of PSPs)</p>
		<p>2.5.2 The further removal of phosphorus from the wastewater and industrial discharges will probably be the use of chemical phosphorus removal as an additional polishing step in the treatment train. The implications on wastewater treatment costs could be high. Therefore a study to investigate the feasibility of installing further phosphorus removal treatment steps at selected works in the Vaal River System is proposed.</p>	WRPS:WQP (and RPW, & Gauteng, Free State & Northern Cape Regional Offices)	Not initiated yet
	<p>2.6 A perspective is needed on the extent and costs of the measures needed (such as banning phosphorus containing detergents) to reduce the phosphorus loads received at the wastewater treatment works.</p>		WRPS:WQP (and RPW, & Gauteng, Free State & Northern Cape Regional Offices)	Not initiated yet
<p>2.7 The results of the Water Research Commission project aimed at developing a perspective on the economics of eutrophication on the water users should be considered. This should include recreational impacts as well as water treatment costs.</p>		RPW (and Gauteng, Free State & Northern Cape Regional Offices)	Not initiated yet	

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ	
3. Microbiological	3.1	The strategy for improving the microbiological water quality is related to getting the wastewater treatment works operating to their specifications and meeting their licence conditions specifically in terms of discharge quality. The strategy is similar to the nutrient management strategy in that the wastewater treatment works must be audited and the "hot spot" areas identified. Plans must be developed in consultation with the local municipalities to retrofit the works in these target areas.	3.1.1 The actions are similar to the nutrient strategy. The auditing, development and retrofitting of the wastewater treatment works should be undertaken as part of the same process as for the assessment of the plants for the removal of nutrients.	Gauteng, Free State & Northern Cape Regional Offices (and RPW, WSR & Local Government)	Busy
	4. Institutional	4.1	The implementation of the WQM strategy will have to be aligned to the institutional development process of the Department and the requirements of the National Water Act 36:1998, as Catchment Management Agencies for the Vaal River WMAs are in progressive stages of establishment. The individual CMS's development is in different phases and the continued evolution of the institutional arrangements must be monitored to ensure that the actions of this strategy are included in catchment management planning; resource management priorities and regional economic development strategies.	Gauteng, Free State & Northern Cape Regional Offices (and IO)	Ongoing (The establishment of the VWQIC will assist with such alignment processes.)
4.2		In implementing this strategy, the Department will specifically have to consider the role of the catchment committees/ organizations and the extent to which they can take responsibility and accountability for specific actions. These organizations could play key roles in communication, co-ordination and providing capacity where necessary.	Gauteng, Free State & Northern Cape Regional Offices (and IO)	Ongoing	

FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	<p>4.3 The role of local government is critical to the success of this strategy. This relates primarily to the management of the discharges of wastewater treatment works. A specific agreement or institutional arrangement has to be entered into between the Department and local government regarding this issue. The problem of non-compliant wastewater treatment works cannot be accepted as a "business as usual" anymore.</p>		Local Government (and Gauteng, Free State & Northern Cape Regional Offices)	Ongoing
	<p>4.4 A strategy steering committee is to be established to oversee the further development and implementation of the reconciliation and the water quality management strategies. The details and proposed functions of the strategy steering committee are discussed under implementation. In association with the strategy steering committee the timeframes associated with implementation actions will be specified by the Department (<i>i.e.</i> the decision on the management actions, the final RWQOs adopted, the implementation of the RWQOs, etc.).</p>		NWRS and WRPS:WQP (and All)	Ongoing (A VWQIC is in the process of being established to specifically focus on water quality management issues. Establishment is targeted for 1 st quarter of the 2011/12 financial year.)
5. Cross-Cutting	<p>5.1 Catchment Studies</p>	<p>5.1.1 Sub-catchments need to be prioritized for catchment studies to determine Level 3 RWQOs in support of the Level 1 and 2 RWQOs.</p>	Gauteng, Free State & Northern Cape Regional Offices (and WRPS:WQP)	Ongoing (Low confidence Level 3 RWQOs are being determined for the Sand-Vet, Schoon-Koek and Modder-Riet Systems. Presentation of the RWQOs to stakeholders is scheduled for November 2011.)
	<p>5.2 Management integration</p>	<p>5.2.1 Sub-catchments need to be prioritized and modeled to integrate end-of-pipe requirements with the determined RWQOs.</p>	WRPS:WQP (and Gauteng, Free State & Northern Cape Regional Offices)	Not yet initiated




FOCUS AREAS	OBJECTIVES	ACTIONS	RESPONSIBILITIES ⁱ	STATUS ⁱⁱ
	5.3 Compliance Monitoring and Enforcement	5.3.1 A strategy needs to be devised on collaboration between the Green and Blue Scorpions.	CME (RPW & Gauteng, Free State & Northern Cape Regional Offices)	Not yet initiated

Table notes:

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CGS:	Council for Geo Science
CME:	Compliance Monitoring and Enforcement
D:	Director
IO:	Directorate Institutional Oversight
IMC:	Inter-Ministerial Committee
IWRP:	Chief-Directorate Integrated Water Resource Planning
NWRP:	Directorate National Water Resource Planning
OA:	Directorate Options Analysis
RPW:	Directorate Resource Protection and Waste
RQS	Directorate Resource Quality Services
ToE:	Team of Experts appointed to advise the IMC through the Directors-General of Water Affairs and Mineral Resources
SO:	Sub-Directorate System Operation
WQP:	Sub-Directorate Water Quality Planning
WRIB	Water Resource Infrastructure Branch
IWRMS:	Directorate Integrated Water Resource Management & Support
WRPS:	Directorate Water Resource Planning Systems
WSR:	Directorate Water Services Regulation

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	Action is completed
	Action is ongoing or busy
	Action has not been initiated