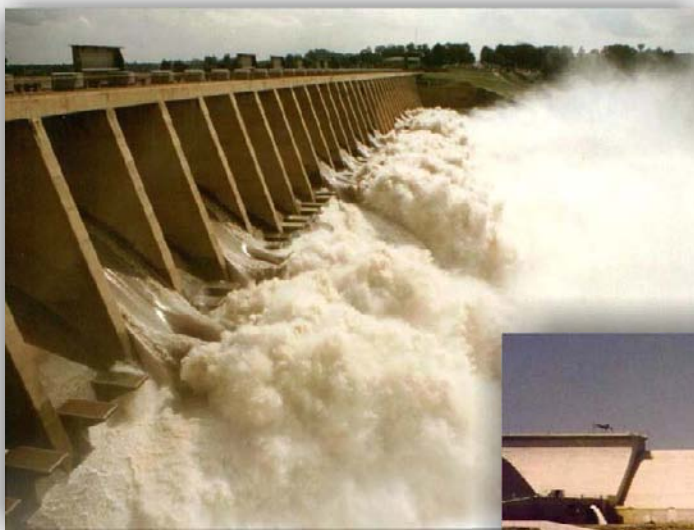




**DEPARTMENT OF
WATER AFFAIRS AND FORESTRY**
Directorate: National Water Resource Planning

Internal Strategic Perspective
Lower Vaal Water Management Area



Oktober 2004

COMPILED BY:



Department of Water Affairs and Forestry
Directorate National Water Resource Planning

INTERNAL STRATEGIC PERSPECTIVE
FOR THE
LOWER VAAL WATER MANAGEMENT AREA (WMA No 10)

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INVITATION TO COMMENT

This report will be updated on a regular basis until it is eventually superseded by the Catchment Management Strategy. Water users and other stakeholders in the Lower Vaal WMA and other areas are encouraged to study this report and to submit any comments they may have to the Version Controller (see box overleaf).

ELECTRONIC VERSION

This report is also available in electronic format as follows:

- DWAF website:
 - Intranet: <http://dwaf-www.pwv.gov.za/documents/>
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or from the Version Controller (see page iv)

The CD contains the following reports (all available on DWAF website)

- Lower Vaal WMA Internal Strategic Perspective (*This Report*)
(Report No: P WMA 09/000/00/0304)
- Vaal River Overarching Internal Strategic Perspective
(Report No: P RSA C000/00/0103)
- The National Water Resource Strategy, First Edition 2004
- The Lower Vaal WMA - Overview of Water Resources Availability and Utilisation
(Report No: P WMA 10/000/00/0203)
- The Lower Vaal WMA – Water Resources Situation Assessment
(Report No: P WMA 10/000/00/0302)

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EXECUTIVE SUMMARY

Introduction

The Internal Strategic Perspective (ISP) for the Lower Vaal Water Management Area (WMA) is described in this document, and represents the Department of Water Affairs' (DWA) view on how Integrated Water Resource Management (IWRM) should be practiced in the WMA.

*The emphasis in this document is on aspects that are specific to the Lower Vaal WMA. The Lower Vaal WMA is part of a greater water supply system which includes a number of neighbouring WMAs. The strategies for IWRM for the greater system are presented in the **Vaal Overarching ISP**. The Lower Vaal ISP should be read in conjunction with the Vaal Overarching ISP to get a complete understanding of the strategies and issues.*

*The information in the report has been compiled from past studies, but more importantly, it captures the knowledge of DWA officials that are active in the different spheres of water resource management of the Vaal River System. In the drafting of the perspectives or strategies contained in this document, cognisance was taken of the legal requirements of the National Water Act and the strategic direction or framework given by the **National Water Resource Strategy (NWRS)**.*

Water resource management is carried out in a changing environment and it should be recognised that this ISP is based on the prevailing situation and conditions at the time of compiling the document. It is the intention of DWA to regularly update this document to keep the information and strategies relevant.

Overview of the Lower Vaal Water Management Area

The climatic conditions vary considerably from west to east across the WMA, with the Mean Annual Precipitation (MAP) reducing from 500 mm in the east to 200 mm in the west with an average of 350 mm. This tendency is reversed when considering potential annual evaporation, which increases from 2650 mm in the east to 2700 mm in the dry western parts of the WMA. The land use in the Lower Vaal WMA is characterised by agriculture with the main crops being maize, cotton, groundnuts, vegetables and sunflowers. Agricultural activities is however dominated by livestock farming. There is also extensive diamond mining activities located in the Lower Vaal water management area. These activities are generating substantial return flow volumes in the form of treated effluent from the urban areas and mine dewatering that are discharged into the river system. These discharges are having significant impacts on the water quality in the main stem of the Vaal River in the Lower Vaal WMA.

The Lower Vaal WMA has an average economy, contributing approximately 2% of the GDP of South Africa. It is expected that economic activity will remain relatively static in the medium to long term. Mining and agriculture are important contributors to the economy of the region, and is expected to continue to play an important role in the economy of this WMA.

Due to the extensive development in the Vaal River System , the local surface water resources in all three the Vaal WMAs have been fully exploited, more than three decades ago. It was therefore necessary to augment the supply by developing various transfer schemes importing water from the Thukela and Usutu to Mhlathuze WMAs, as well as from the Kingdom of Lesotho through the Lesotho Highlands Water Project (LHWP).

Water Availability

The surface water availability in the Vaal River System is estimated through a set of water resource models, each fulfilling a particular function in the management of the water resources. Combined, these models serve as a decision support tool that contains a large and comprehensive database of hydrological and physical system characteristics, required to simulate the water resource systems as realistically as possible. Due to the interdependencies, the management and planning of the Vaal River System is undertaken at the national level and not by the Lower Vaal water managers (CMA when it is established, until then the DWAF Regional Office).

The Lower Vaal water managers will be responsible for the assessment of the availability of the local groundwater and surface water resources used to supply local authorities and district councils without access to the Vaal River System water supply infrastructure.

Water Requirements

Water use in the water management area is dominated by irrigation, which represent 80% of the local requirements for water. About 12% of the requirements is for urban and industrial use, 7% for rural domestic supplies and stock watering, and the remainder for mining purposes.

The water requirement projections that are currently used for planning originate from the development of the National Water Resource Strategy (NWRS). The total water requirements in the Lower Vaal WMA is currently 643 million m³/annum. The total water requirements for the Lower Vaal are projected to reach 642 million m³/annum by the year 2025, for the base growth scenario.

Water Balance Reconciliation

The water balance for the Lower Vaal WMA indicates that for the year 2000, an overall surplus in supply of 30 million m³/annum was available. With the commissioning of Phase 1b of the LHWP (Mohale Dam and transfer tunnel) during the latter part of the year 2003, an additional 344 million m³/annum is available to the Vaal river system. This surplus is expected to be gradually depleted over time to supply the growing water requirements in mainly the Upper Vaal WMA. The Lower Vaal system is expected to be in balance for the year 2025 using the base requirement scenarios.

What is important to recognise is that this estimated excess in supply is qualified as “conditional” since it is only available if all the transfers are fully operational. In practice the volume of water conveyed through the Thukela-Vaal Transfer scheme will be determined annually, effectively operating the system such that the water demands are in balance with the supply. The quantity transferred will thus increase over time in line with the growth in the water requirements.

The possible reconciliation options for the Vaal River System are dealt with in the Vaal Overarching ISP. The role of the Lower Vaal CMA will largely be water conservation and demand management (WC&DM), trading of water allocations and assisting with the water balances of the local authorities and district municipalities who are dependent on local resources for their supply and not the main water supply infrastructure supported by the Vaal River System.

Due to the very low growth rate of the projected water requirements (projected demand curve is flat) the impact of Water Conservation and Demand Management could result in a substantial decrease in water requirements in the Lower Vaal WMA. It must be noted that, due to the lack of system wide planning information on possible future WC&DM measures, the water balance calculations presented above do not allow for the impacts of WC&DM. This was identified as a gap in the current knowledge in the Vaal Overarching ISP and a study is being proposed to collate all planning information on WC&DM. The targets for WC&DM will be set by the Vaal Overarching Study and the role of the Lower Vaal CMA will be to promote WC&DM and encourage the water service providers to achieve their targets.

The allocation of the conditional surplus will be managed by the National Department of Water Affairs and Forestry in accordance with the licensing process and adhering to the conditions that are presented in more detail in **Strategy Table A.3.2 of Appendix A.**

Water Quality Management

The water quality varies from poor in the highly developed areas to good in the less developed areas. The water quality is impacted on by point discharges from industries, wastewater treatment works, mine dewatering, irrigation return flows and diffuse sources such as runoff from mining and industrial complexes, agriculture and urban areas.

The current approach adopted in managing water quality is to apply the steps presented below on a sub-catchment basis. The first step is to carry out a situation assessment during which Interim Water Quality Objectives (WQO) are established and water quality variables of concern and sources of pollution are identified. The WQO are based on the water quality requirements of the user sectors as well as from the ecology. The subsequent phases in the process, following the situation assessment, are to develop water quality management plans or catchment management strategies. During this phase water management interventions such as source control, treatment and dilution are assessed. These phases also involve the revisiting of the WQO in an iterative manner to reach a balance between the water user requirements and achievable management strategies that do not impede continued economic growth.

The cascading characteristic of the three Vaal WMAs has the consequence that the water quality of the main stem of the Vaal River in the downstream WMAs is impacted on, not only by the activities in the WMA itself, but also by the water received from upstream. In addition, the water quality in the Vaal River will also impact on the water quality of the Orange River in the Lower Orange WMA. Due to this inter-dependency it was identified that the current process of managing water at sub-catchment level, should be expanded to integrate management activities across sub-catchments, to meet shared water quality objectives in major tributaries as well as in the main stem of the Vaal River. This study has been prioritised as part of the Vaal Overarching ISP. The Lower Vaal CMA will have to revisit existing WQO and carry out future development of sub-catchment strategies within the framework of the Integrated Study.

Institutional Aspects

The role of the Lower Vaal WMA CMA will include:

- To manage the water quality by setting WQOs and developing a CMS as per the Water Quality Management Strategy. The setting of the WQOs will be within the framework of the Integrated Water Quality Management Plan for the Vaal River System (See details in Strategy A2.2).*
- The monitoring of the system to provide management information for water quality management, abstraction control and input to the overarching operations and planning processes.*
- Provide input into the supply of local authorities from local groundwater and surface water resources. This will be in the form of strategic level guidance as to where water can be obtained and the level of study needed to be submitted with the license application.*
- All water use licences will be issued through the Lower Vaal WMA CMA.*
- A very important communication role between the Water Users and the utility/DWAF Head Office*
- Promotion of WC&DM through the water service providers and local authorities/DWAF Head Office to achieve efficient use of water. Only once efficient use has been achieved can further transfers be considered.*
- Other delegated functions as determined during the process of establishing the CMA.*

Water Infrastructure Management

Due to the inter dependencies of the Vaal WMAs, the operation of the infrastructure has to be undertaken in a coordinated way to achieve the best efficiencies and balance potential among stakeholders. This management will therefore be undertaken at the National level.

The Lower Vaal CMA may, depending on the findings of the Integrated Water Quality Study, be responsible for the management of treatment and reuse infrastructure for mine dewatering and sewage treatment plant return flows.

Monitoring and Information Management

The successful operation of the Vaal River System requires effective monitoring networks and information management systems. There is an extensive network of flow, rainfall and water quality monitoring stations in the catchment. However, studies have highlighted the need to expand the monitoring network to include more gauges to determine river losses, bulk distribution system losses, and to track water requirements. Bio-monitoring should be included to assist with the determination and implementation of the ecological Reserve. A consolidated assessment needs to be made of all the monitoring and data management requirements of the Vaal River System. This process should identify all the water resource management activities that require monitoring information, and should focus on the integration of monitoring systems that are directly under the control of the Department, as well as from other institutions.

The Lower Vaal water managers will be required to co-ordinate all the monitoring and information requirements within the WMA. This will include the compliance and other monitoring requirements of the WMA itself as well as the monitoring requirements of the Vaal River System to be used by the National body carrying out the overarching management.

ISP Implementation Strategy

The ISP is intended to act as DWAF's perspective on how the Lower Vaal WMA water resources should be managed. The final ISP will be published and be open to comments from local authorities, water user associations and other water related forums and interested stakeholders. Mechanisms are to be put in place to capture anomalies and it is intended that formal updates of the document will occur periodically until such time as the Catchment Management Agency is technically functional and a Catchment Management Strategy developed.

Internal Strategic Perspectives (ISPs) for the Central Region: Lower Vaal Water Management Area (WMA 9)

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LIST OF ABBREVIATIONS

Acronym	Meaning
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
DDG	Deputy Director General
DEAT	Department of Environment Affairs and Tourism
DWAF	Department of Water Affairs and Forestry
EFMP	Environmental Flow Management Plan
EFR	Ecological Flow Requirements
EIA	Environmental Impact Assessment
EMC	Ecological Management Class
EMPR	Environmental Management Plan Report
GWS	Government Water Scheme
IDP	Integrated Development Programme
IFA	Instream Flow Assessment
IFR	Instream Flow Requirements
IRDP	Integrated Rural Development Programme
ISP	Internal Strategic Perspective
IWRM	Integrated Water Resources Management
LHWP	Lesotho Highlands Water Project
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
NEMA	National Environmental Management Act
NGO	Non Governmental Organisation
NWA	National Water Act
NWRS	National Water Resources Strategy
ORRS	Orange River Development Replanning Study
OVTS	Orange Vaal Transfer Scheme
RDM	Resource Directed Measures
RDP	Reconstruction and Development Programme
TDS	Total Dissolved Solids
TLC	Town Local Council
VAPS	Vaal Augmentation Planning Study
VRSA	Vaal River System Analysis Study
VRSAU	Vaal River System Analysis Update
WARMS	Water-use Authorisation and Registration Management System
WC/ WDM	Water Conservation/ Water Demand Management
WfW	Working for Water
WMA	Water Management Area
WQM	Water Quality Management
WQO	Water Quality Objectives
WR90	Water Resources 1990 Project
WRSAS	Water Resources Situation Assessment Studies
WSA	Water Services Act
WSAM	Water Situation Assessment Model
WSDP	Water Services Development Plan
WUA	Water Users Association

GLOSSARY OF TERMS

Term	Meaning
Aquiclude	A bed, formation or group of formations essentially impervious to water.
Aquifer	Any strata or a group of interconnected strata comprising of saturated earth material capable of conducting groundwater and of yielding usable quantities of groundwater to borehole(s) and / or springs (a supply rate of 0.1 L/s is considered as a usable quantity). Latin: aqua water and ferre to carry.
Borehole	Drilled hole used to abstract, recharge or monitor groundwater.
Catchment Management	It is the holistic and integrated management of South African water resources at catchment level. Its aim is to achieve a balance between development and the protection of our water resources and to involve people in water resources decision-making processes.
Catchment	An area of land from which any rainfall will drain into the water course or watercourses and flow to a common point, has definable physical boundaries.
Catchment Management Agency (CMA)	A water management institution which manages Water Management Area (WMA).
Catchment Management Strategy (CMS)	A strategy for a water management institution which manages Water Management Area (WMA).
Department of Water Affairs and Forestry (DWAF)	DWAF is the national custodian of South Africa's water and forestry resources. It is primarily responsible for the formulation and implementation of policy governing these two sectors.
Environmental Impact Assessment (EIA)	EIA is a project specific process, which looks at how a proposed development might impact on the environment, and at how those impacts might be mitigated.
Environmental Management Frameworks (EMF)	The EMF is a spatial inventory, essentially a filing system of information, with a strong focus on biophysical parameters. Specific environmental management parameters are connected to this information.
Geographical Information System (GIS)	A GIS is a computer-based tool for mapping and analysing things that exist and events that happen on Earth. GIS technology integrates common database operations such as query and statistical analysis with the unique visualisation and geographic analysis benefits offered by maps.
Groundwater Information Index System (GIIS)	The GIIS is essentially a database which contains basic information on the sources of groundwater, related subject matter and provides planners and consultants with a useful tool to source existing geohydrological reports and other relevant data.
Groundwater	All subsurface water occupying voids within a geological stratum.
Integrated Environmental Management (IEM)	IEM has become the umbrella term, or toolbox, within which all environmental assessment processes, and environmental management practices, reside. IEM has become a guiding philosophy - the interface for the various environmental management processes and is the umbrella covering EIA, SEA and EMP.
Ventilated Improved Pit-latrine (VIP)	A sanitation facility consisting of a stable cover or slab over a pit which is ventilated by a pipe extending above the roof of the top structure, with fly-proof netting across the top. The interior of the top structure is maintained in relative darkness.

Term	Meaning
Working for Water (WfW)	It is a multi-departmental public works programme, with the express purpose of dealing effectively with the problem of invading alien plants. It also addresses one of the greatest challenges facing South Africa, that of unemployment.
Water Management Area (WMA)	It is an area established as a management unit in the national water resource strategy within which a catchment management agency will conduct the protection, use, development, conservation, management and control of water resources. There are 19 WMAs in SA.
Water Resource Management (WRM)	WRM ensures management of our water resources to ensure the sustainable utilisation of a very limited resource.
Water Resources Planning (WRP)	Provides broad guidelines as well as details for the reconciling of water use requirements against available water resources.
Water Quality Management (WQM)	WQM ensures that the water resources of South Africa are fit for use for humans, recognised users, and ensures that the health of the water environment is protected and improved on a sustainable basis.
Water Services Act (Act 108 of 1997) (WSA)	This Act provides for: the rights of access to basic water supply and basic sanitation; the setting of national standards and of norms and standards for tariffs; water services development plans; a regulatory framework for water services institutions and water services intermediaries; the establishment and disbanding of water boards and water services committees and their powers and duties; the monitoring of water services and intervention by the Minister or by the relevant province; financial assistance to water services institutions.
Water Services Authorities (WSAs)	Any municipality, including a district or rural council as defined in the Local Government Transition Act, 1993 (Act No. 209 of 1993), responsible for ensuring access to water services.
Water Services Providers (WSPs)	Any person who provides water services to consumers or to another water services institution, but does not include a water services intermediary.
Water Services Development Plan (WSDP)	A WSDP focuses on water services, the supply thereof and sanitation. The focus of a WSDP is to provide effective water services to the consumers in accordance with the aims of the Government. It is also a tool to ensure effective, sustainable and economical water services that is managed as a business.
Yield	Volume of water per unit of time that can be obtained from a borehole