Appendix A : Middle Vaal WMA Strategy Tables

Middle Vaal Water Management Area Strategies

Strategies Table of Contents

INTRODUCTION TO STRATEGY TABLES

The first 2 chapters of the Middle Vaal WMA Internal Strategic Perspective (ISP) describe the ISP process, paint a broad perspective of the water situation in the WMA, and describe the key issues that have to be dealt with. The crux of the ISP is located in a series of strategy tables presented in **Appendix A**. The strategy tables for each area present the management objective (what we are trying to achieve); an assessment of the situation along with a motivation as to why the strategy is required; the required actions; responsibilities; priorities; and relevant supporting references. A version control is attached for future versions of this ISP.

Certain issues are clearly applicable to all WMAs in the country and for these a national policy to guide the strategy needs to be developed. These issues and aspects were identified and flagged, during the development of this ISP, for consideration at **National Level**.

The table below provides a brief description of the elements contained in the strategy tables.

Definitions of terminology used in the Strategy Tables

Management Objective	Description of what DWAF is trying to achieve
Situation assessment	Description of the current situation and related issues and motivations to support the management actions.
Management actions (M)	The actions which need to be taken to resolve issues and tasks identified in the situation assessment.

A1. WATER BALANCE AND WATER RESOURCE RECONCILIATION STRATEGIES

A1.1 RESOURCE AVAILABILITY

Management objective:	Ensure reliable estimates of the water resources (surface and groundwater) are available to effectively conduct Integrated Water Resources Management. The factors impacting on the water resources needs to be clearly defined and understood.
Situation Assessment:	**OVERVIEW** The water in the Middle Vaal WMA flows from the Upper Vaal, across the Middle Vaal, Lower Vaal and Lower Orange WMAs before reaching the Atlantic Ocean near the town of Alexander Bay in the western corner of the country. This cascading characteristic of the three Vaal WMAs has the consequence that the water availability in the main stem of the Vaal River is impacted on by the availability of water in the Vaal River System. In addition, the water availability in the Vaal River will also impact on the water availability 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 resources in the main stem of the Vaal River. This will be undertaken at a National Departmental level. However, the tributaries are generally managed by the CMA as a local resource. Hence this discussion has been divided into "WMA-wide Aspects" and "Sub-catchment-specific Aspects". **SURFACE WATER RESOURCES** *WMA-WIDE ASPECTS* The Vaal River System is the most important water resource system in South Africa as it provides water to more than 40% of the country's inhabitants and, with numerous industries and mines in the supply area, supports the production of more than 50% of the country's GDP. Mean annual runoff (MAR) from the total Vaal River catchment is approximately 4 000 x $10^6 m^3$. When expressed as an equivalent unit runoff from the 196 000 km^2 catchment, the MAR averages out at about 15 mm. However, the pattern of runoff over the catchment is one of a fairly gradual decline from east to west, in accordance with the east to west decline of rainfall associated with an increase in evaporation rates. For the Middle Vaal WMA, the MAR totals 887,5 x $10^6 m^3$. Unit runoff varies from over 23 mm in the upper reaches of the Rhenoster and Vals Rivers to as little as 4 mm in the vicinity of the Bloemhof Dam. Equivalent figures for mean annual rainfall (MAP) are 570 mm (east) and 500 mm (west) and, for mean annual evaporation (MAE) – 1 800 mm (east) and 2 600 mm (west). ***[Ref 2]*** The Middle Vaal WMA is a component of the extended Vaal River System for which an integrated system's model has been compiled to account for the complex inter - dependencies that exist due to connectivity of the three Vaal WMAs. This model is currently used to assess the available water resources and is referred to as the Water Resource Planning Model (WRPM). ***[Ref 4]***

Situation Assessment: (Continued)	The existing (February 2003) Integrated Vaal River System Model contains a hydrological database that covers the period 1920 to 1995 (water years) and includes re-calibrated water quality (Total Dissolved Solids - TDS) modules that were compiled as part of the *Vaal River System Updated Study* (VRSAU) **[Ref 3]**. Given the comprehensive level of detail of the VRSAU study there is sufficient knowledge and a high level of confidence in the water resource availability and water quality TDS information that is available for the management of the water resources. The existing water resource network system covers the entire catchment of the WMA and simulates all the major dams individually. Certain users and small dams were, however, lumped together to simplify the system configuration. Although these simplifications are acceptable for the purpose of modelling the larger Bloemhof Dam Sub-system, finer resolution definition network configurations could be required in cases where a distinction has to be made in the water resources available among particular users at a local level. It is proposed that increased resolution analysis be undertaken in situations when specific licences applications need to be assessed or where supply problems need to be resolved. *Factors having significant impacts on the available surface water resources include:* • The combined effect of small farm dams on the yield of the larger reservoirs in the Water Management Area. It is estimated that the total storage capacity of these dams are 199 million m^3 in the Middle Vaal WMA. **[Ref 3]** • In combination with the small farm dams the water requirements in the tributary catchments also reduces the water available in the larger dams. Reliable estimates of the water use are required and will be obtained through the Registration and Verification processes. (See **Water Requirements Strategy Table A.1.2** for more details) • The operating rules applied in the Upper Vaal WMA, particularly the blending operating rule in the Vaal Barrage, significantly impacts on the flow in the Vaal River. This is controlled at a National level. (Refer to Vaal Overarching ISP for details **[Ref 4]**). • There is a growing importance on return flows in the Middle Vaal catchment, requiring integrated planning around this issue. *SUB-CATCHMENT SPECIFIC ASPECTS* The Middle Vaal WMA comprises 3 sub-areas as denoted in the NWRS, namely the Rhenoster/Vals, Middle Vaal and Sand/Vet sub areas. (Refer to the map provided in **Appendix B**). These sub-areas have been further subdivided into a total of 7 sub-catchments for the purpose of highlighting local issues. The main stem of the Vaal River is located within the Middle Vaal sub-area with the remaining sub-areas being tribuatary catchments to the Vaal River. The Middle Vaal WMA comprises the following sub-catchments : Rhenoster River, Vals River, Schoonspruit, U/S Bloemhof, Allemanskraal, Erfenis and the Vet River Systems. The Middle Vaal WMA is dependent on water releases from the Upper Vaal WMA for meeting the bulk of the water requirements by the urban, mining and industrial sectors within its area of jurisdiction, with local resources mainly used for irrigation and smaller towns. Water is also transferred via

Situation Assessment: (Continued)	the Vaal River through this WMA, from the Upper Vaal WMA to the Lower Vaal WMA. Water quality in the Vaal River is strongly influenced by usage and management practices in the Upper Vaal WMA. **Middle Vaal Sub-area** *Schoonspruit sub-catchment:* A study has started in the dolomitic compartments of the Schoonspruit and Crocodile/ Marico areas to investigate groundwater resources that straddle the aquifers of these catchments in order to understand the flow of groundwater in these areas as well as to ensure that resource availability is not duplicated and the management of the resource is allocated to one of the CMA's. A study needs to be undertaken to improve the modelling of the Schoonspruit and to provide answers with regard to the relationship between dolomitic water and surface water. This study should take cognisance of the catchment management strategy that is presently being developed for the Schoonspruit sub-catchment. The study should include an assessment of the availability of the Johan Neser Dam as the dam is located in the Schoonspruit downstream of the dolomites and is possibly being negatively affected by the abstractions from the dolomites. The option of utilising the dolomitic compartments as underground storage dams in order to support the downstream surface water users has been identified as a possible groundwater-surface water operating rule. The proposed model to be developed for the Schoonspruit catchment should initially be used to assess this option. Further detailed feasibility assessments should thereafter be considered. *U/S Bloemhof sub-catchment:* This catchment area covers the main stem of the Vaal River as its traverses the Middle Vaal WMA. This sub-catchment is characterised by a major transfer in from the Upper Vaal and out to the Lower Vaal. The tributaries in this sub-catchment makes little contribution to the water resources and has limited further exploitable potential. As a result of the high level of regulation provided by the Vaal Dam and Grootdraai Dam in the Upper Vaal WMA, there is little potential to further increase the surface water availability in the Vaal River itself in this area. Water supply from the Vaal River is generally a problem due to the poor quality of water in the Vaal River, for example the quality problems experienced at Balkfontein is a case in point. (Refer to Strategy **A2.2 Water Quality Management Strategy**) Although the storage basin of Bloemhof Dam is located in this WMA, the water in the dam is utilised to supply water users in the Lower Vaal WMA and the dam is controlled by the Lower Vaal WMA. The border of the WMA is on the upstream side of the Bloemhof Dam wall so that the water in the dam is considered to be in the Middle Vaal WMA and the release controlling structures in the Lower Vaal WMA. The availability of local surface water resources within this sub-catchment is limited and any further augmentation of surface water resources will have to be supplied from the surplus that is available in the Vaal River System (Refer to **Vaal Overarching ISP**).

Situation Assessment: (Continued)	**Rhenoster-Vals Sub-area** *Rhenoster sub-catchment:* The only significant regulating storage in the sub-catchment is Koppies Dam which has the purpose of supplying irrigation and domestic water to the Koppies Town. A diamond mine development near Viljoenskroon is considering various options to make water available to the mine, including the purchasing of water rights from irrigators currently receiving water from Koppies Dam. Consideration should also be given to the combined use of groundwater and surface water resources. Viljoenskroon abstracts water from the Rhenoster River, however their abstraction is not supported from Koppies Dam. Viljoenskroon is also supplied from the Vaal River to augment their water supply in times of shortage in the Rhenoster River. *Vals sub-catchment:* The Vals area is experiencing serious water shortages at present with the result that water restrictions have been imposed in the Kroonstad area. No further development of surface water resources in this catchment is possible. **Sand-Vet Sub-area** *Allemanskraal sub-catchment:* There is no current need for the development of further water resources in this area. The yield from surface water resources upstream of and including Allemanskraal Dam, is allocated to scheduled irrigation requirements in the downstream Vet sub-catchment. The potential for surface water resources development within this area is limited and would impact on downstream users. *Erfenis sub-catchment:* The available resources upstream of Erfenis Dam, as well as the storage provided by Erfenis Dam in this sub-area, have been allocated mainly for irrigation requirements that are located in the downstream Vet sub-catchment. The potential for surface water resources development within this area is limited and will impact on downstream users. *Vet sub-catchment:* The water resources of this sub-catchment are augmented by the transfers from the Vaal River (Vaal Sub-catchment) by Sedibeng Water for urban and bulk use in the Free State Goldfields and by the yield of Erfenis and Allemanskraal dams. The re-use of effluent generated in this sub-catchment has recently reduced due to the closure of the acid plant that was used by he mines. It is proposed that alternative options be investigated to utilise the return flows. **GROUNDWATER RESOURCES (Refer to Appendix D):** *WMA-WIDE ASPECTS* Groundwater represents a large potential resource particularly for local supply in areas that are distant from the main river system. However, there is general uncertainty about the groundwater availability (exploitable volume not contributing to surface base flow) in the WMA, although there is good understanding of groundwater in specific areas, e.g. Wesselbron and Ventersdorp.

Situation Assessment: (Continued)	Due to the fact that the availability of groundwater is largely dependent on localised sub-surface characteristics, estimates of the potential of the resource should be area specific. It is therefore recommended that the provision of data on the availability of groundwater be driven by the need for water in particular areas. A model is currently being developed in the dolomitic areas (making use of existing information) to improve the understanding of the interaction between ground and surface water. Other directives regarding the utilisation of groundwater are provided in the **Reconciliation Strategy A.1.3**) *SUB-CATCHMENT SPECIFIC ASPECTS* Refer to ***Appendix B*** for map of Middle Vaal indicating the 3 sub-areas as denoted in the NWRS, viz. Rhenoster/ Vals, Middle Vaal and Sand/Vet sub areas. These sub-areas have been further subdivided into a total of 7 sub-catchments for the purpose of highlighting local issues. The main stem of the Vaal River is located within the U/S Bloemhof sub-catchment of the Middle Vaal sub-area. **Middle Vaal Sub-area** *U/S Bloemhof sub-catchment:* The potential to further increase the water resources availability within this sub-catchment is limited mainly to the exploitation of groundwater resources but is also dependent on the availability of water from the Upper Vaal WMA. Groundwater is the main potential source of water to supply new/future local users that do not have access to the Vaal River. The availability of this resource will have to be investigated at a local level. Boreholes in Allanridge have been polluted by the slimes dams and have been sealed. An investigation is required to determine the availability of water of acceptable quality from this source. The investigation is, however, not a high priority since it has been established that the pollution plume will not move under the current abstraction rates. It is, however, essential to continue the monitoring of adjacent boreholes in order to be able to detect any changes in the situation. This is currently being undertaken by the mines themselves. There is a significant aquifer close to Wolmaranstad that is being exploited to supplement the water requirements of the town. Wolmaransstad and Wesselsbron are the most important urban centres in the area. A significant amount of small scale diamond mining occurs in this area. The availability of local surface water resources within this sub-catchment is limited and any further augmentation of surface water resources will have to be supplied from the surplus that is available in the Vaal River System (Refer to **Vaal Overarching ISP**). Further local development of water resources is therefore essentially limited to the exploitation of groundwater resources. *Johan Neser sub-catchment:* The Schoonspruit dolomites are known to have high groundwater-yielding capacity with a high potential for groundwater exploitation. However, it is not known whether there is any remaining exploitable potential with regards to groundwater in this area due to our poor knowledge of the interaction between dolomitic groundwater and surface water.

A study has started in the dolomitic compartments of the Schoonspruit and Crocodile/Marico areas to investigate groundwater resources that straddle the aquifers of these catchments in order to understand the flow of groundwater in these areas as well as to ensure that resource availability is not duplicated and the management of the resource is allocated to one of the CMA's.

A study needs to be undertaken to improve the modelling of the Schoonspruit and to provide answers with regard to the relationship between dolomitic water and surface water. This study should take cognisance of the catchment management strategy that is presently being developed for the Johan Neser (Schoonspruit) sub-catchment. The study should include an assessment of the availability of the Johan Neser Dam as the dam is located in the Schoonspruit downstream of the dolomites and is possibly being negatively affected by the abstractions from the dolomites.

The option of utilising the dolomitic compartments as underground storage dams in order to support the downstream surface water users has been identified as a possible groundwater-surface water operating rule. The proposed model to be developed for the Schoonspruit catchment should initially be used to assess this option. Further detailed feasibility assessments should thereafter be considered.

The Ventersdorp Lavas are also a source of exploitable groundwater, yielding between 0,5 and 5 l/s. This source has not been developed but it is known that there is no interaction between the lavas and surface water. This can be verified with available data.

In the Klerksdorp area 36 Ml/day is pumped from Stilfontein Mine (Margaret Shaft) of which 18 Ml/day is licensed for mining use. It is expected that the mine is recharged from the dolomite area. There is currently a study in place (Schoonspruit/ Koekemoerspruit CMS) to investigate the groundwater situation.

Pumping from Vierfontein Mine has been stopped and the mine is currently decanting at a rate of 40 l/s. A gauging weir will be built (using Anglo Collieries funds) to measure the decant volume into Vierfontein Spruit.

Rhenoster-Vals Sub-area

Rhenoster sub-catchment:

A diamond mine development near Viljoenskroon has undertaken a groundwater availability assessment and, according to their findings, there is inadequate groundwater resources to support the requirements of the mine.

Vals sub-catchment:

Although water restrictions have been effected in Kroonstad, there appears to be adequate groundwater resources in this area (2–5 l/s per borehole according to National Groundwater maps), which can be developed as a possible source for urban use. Limited groundwater monitoring is being done in the area to assess groundwater quality trends. It was identified that in order to utilise these groundwater resources, further monitoring and assessments need to be undertaken. The intention is to focus these activities near the towns where groundwater can be utilised.

	Sand-Vet Sub-area *Allemanskraal sub-catchment:* There is no current need for the development of further water resources in this area. In terms of groundwater resources there does not appear to be much groundwater resources available in this area according to the hydrological mapping. *Erfenis sub-catchment:* The potential for water resources development within this area is limited to the exploitation of groundwater resources. Reasonable information is available in Verkeerdevlei with regard to groundwater resources. *Vet sub-catchment:* Groundwater use in Welkom is limited due to the quality of the water in this area being naturally poor.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1**. The hydrological models and methodologies that should be applied to address the resource availability in the unregulated areas of the catchment will be developed during a pilot study to be undertaken on the Mhlathuze River catchment. (a) These more rigorous models and calculation methodologies should be used to analyse the resource availability of areas where water resource problems exist. (b) In the short term, until the above study is completed, the existing WRYM system configurations can be refined when needed to evaluate particular local resource situations.	NWRP (Priority 1)
	M2. Update the surface water resource availability estimates if it is confirmed that the registered water use is significantly different from the current estimates (See **Strategy A.1.2 Water Requirements Strategy**). The important variables to consider are small dams and water use for irrigation purposes. (Any difference between the actual water use and the data currently used in the models is masked by the streamflow hydrology.)	Regional Office (Priority 1)
	M3. Quantify the interaction between groundwater and surface water in the catchment. The area-specific understanding of groundwater availability needs to be improved, specifically Schoonspruit/ Koekemoerspruit and Wolmaranstad.	NWRP (Conditional Priority)

	M4. System Yield analyses to determine the effect on the overall systems are required for the smaller water supply systems mainly to determine the water availability and to identify shortages and surpluses within these smaller sub-systems. This will be undertaken only on a needs basis or in reaction to licence applications. An urgent need exists for a System Yield Analysis in the Schoonspruit sub-catchment, and possibly the Vals sub-catchment at a later date.	NWRP (Conditional Priority)
	M5. Undertake monitoring and an assessment of possible groundwater resources to alleviate the water availability problems in the Vals River Catchment. Specific attention needs to be given to water supply to Kroonstad.	Regional Office (Priority 1)
	M6. The availability of groundwater as the main potential source of water to supply new local users, that do not have access to the Vaal River, needs to be investigated.	Regional Office (Priority 1)
	M7. Investigate the re-use of effluent in the Vet sub-catchment.	Regional Office (Priority 1)
	M8. An investigation is required to determine the availability of suitable water from boreholes in Allanridge. These boreholes have supposedly been polluted by the slimes dams in the area and have therefore been sealed.	Regional Office (Priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302 3. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF Report no : P C000/00/18496 4. Internal Strategic Perspective : Vaal River System : Overarching, 2004. DWAF Report No. P RSA C000/00/0103.	

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A.1.2 WATER REQUIREMENTS

Management objective:

Ensure that the knowledge base on the water requirements in the WMA is realistic and updated on a regular basis. Furthermore, maintain and update water requirement projection scenarios for planning and management purposes.

Situation Assessment:

Water use data:

The overall water requirement figures in million m^3/a as at year 2000 quoted in the National Water Resources strategy are as follows **[Ref 1]**:

Sub-area	Irrigation	Urban (1)	Rural (1)	Mining and bulk industrial (2)	Power generation (3)	Afforestation (4)	Total local requirements	Transfers out	Grand Total
Rhenoster-Vals	26	20	8	0	0	0	**54**	0	**54**
Middle Vaal	33	35	13	48	0	0	**129**	559	**688**
Sand-Vet	100	38	11	38	0	0	**187**	2	**189**
Total	**159**	**93**	**32**	**86**	**0**	**0**	**370**	**502**	**872**

Source : Middle Vaal Water Management Area : Overview of Water Resources Availability and Utilisation

Note: Figures based on 1995 Development Curve

(1) Includes component of Reserve for basic human needs at 25 ℓ/c/d.

(2) Mining and bulk industrial water uses which are not part of urban systems.

(3) Includes water for thermal power generation only. (Water for hydropower, which represents a small portion of power generation in South Africa, is generally available for other uses as well.)

(4) Quantities given refer to impact on yield only.

The existing projections for urban water requirements are acceptable and these figures should be retained and merely be updated annually for actual use. Irrigation water use is not expected to grow.

The actual water use data is collated from the different DWAF offices and bulk users on an annual basis, currently captured in a spreadsheet database. This information is compared with the projected water requirements in order to make adjustments (in the short-term) for use in the annual operating analysis. It should be noted that the data on actual water use for irrigation is only partially collated on an annual basis and that there is room for improving the data collection in this regard.

Sedibeng Water and Midvaal Water also compile water requirements projections on a regular basis. Comparisons of these projections are made with the NWRS projection in order to make informed decisions with respect to deviations in trends.

The water required for the ecological Reserve needs to be quantified. Refer to **A.2.1: Reserve and Resource Quality Strategy**.

Registration of water use:

This process has been largely completed and indications are that the registered use for irrigation is much higher than the estimates used in the models, which are based on the work of Loxton Venn and Associates.

The process of verification of actual water use and classification in terms of lawfulness is in progress. If the verification process confirms the registered irrigation

Situation Assessment: (Continued)	water use then this will have serious implications for the water balance for the WMA implying that the water balances will need to be re-assessed. **Water requirement scenarios:** The water requirement scenarios currently used for planning originate from the National Water Resources Strategy. The approach to be adopted in the management of the water requirement projections is that the users are responsible for projections. The role of DWAF/CMA will be to undertake overall checks to audit this important data. Water requirements for the smaller water users such as the use of mine and sewage treatment plant effluent for irrigation will be managed through the licensing process. The water requirement scenarios will be based on population as the main driver and the per capita water demand which will be based on the socio economic standing of the users. The projections must also account for WC&DM and provide estimates of return flows. DWAF has developed a methodology of making water requirement projections accounting for WC&DM and estimating return flow volumes. The Department will promote this methodology with the larger users in the WMA. The following gaps were identified in the existing knowledge: **1.** The extent to which the registered use exceeds allocations and the legality of the registered use needs to be determined. This is required for the rest of the Schoonspruit, Vals, Rhenoster, Wesselbron for surface water use and in the Schoonspuit and Wolmaranstad or groundwater use. **2.** The large variations in figures of irrigation demands between the VRSAU and Loxton Venn needs to be resolved, through the verification process. *The following requirements were identified in terms of water requirements* **1.** The water use and return flows need to be monitored on a continuous basis and checked against the water requirement projections. The impacts of WCDM measures on the projections should also be monitored. 2. The latest population figures (2000 census) and economic data should be used to revise projections. The impacts of WCDM on the projections should be considered as part of the updating process.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** The process of verification of existing lawful use needs to be completed. Comparisons should be made between the lawful use and the water use data applied in the water resource system models. It is important that this management action is undertaken as soon as possible as this information is crucial for future new allocations. The verification process should be done in accordance with the following priority schedule: **Priority List:** 1. Vals River Sub-catchment 2. Rhenoster Sub-catchment 3. Schoonspruit Sub-catchment 4. Upper Sand and Vet River Sub-catchments	Regional Office (Priority 1)
	M2. The current practice of annual updates of water use and water requirements should be continued for the Vaal River System as a whole. The collection of irrigation water use data should be improved in this process.	Water Resource Planning Systems (On-going)
	M3. A study should be undertaken every 5 years to update the water requirement projections. Revised projections should incorporate water quality issues, the reserve, as well as scenarios of WCDM measures - see **WCDM strategy 4**.	NWRP (Priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302 3. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF report no : P C000/00/18496	

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A.1.3 WATER BALANCE RECONCILIATION

Management objective:	Manage the water resources to maintain a surplus or balance between the available water resources and the water requirements through progressive implementation of management measures. The aim is to schedule and implement low cost measures first, whereby the most costly measures (usually large capital intensive developments) are postponed.
Situation Assessment:	**Overall water balance situation (Integrated Vaal River System) (see also Vaal Overarching Report):** The Middle Vaal WMA as a component of the extended Vaal River System has been the subject of various studies in the past, which have the purpose of quantifying the water resources availability and/or evaluating measures to augment the water resources. The details of the water balance reconciliation in the WMA in terms of the supply to those users with access to the main stem are discussed in the **Vaal Overarching ISP**. The salient points made in the Vaal Overarching ISP are listed below. For details it is recommended that the Vaal Overarching ISP be consulted. • With Phase 1B of the LHWP in place, there is a surplus of 300 million m^3, which is estimated to be able to supply the projected water requirements until 2025. • It is important to note that the current excess or surplus is only available under the condition that pumping occurs from the Thukela-Vaal scheme. The available excess in supply is therefore qualified as a conditional surplus. In practice, the volume of water conveyed through the Thukela-Vaal Transfer scheme will be reduced to save pumping costs thus effectively operating the system to balance the water demands with the supply. • Based on the conditional surplus, water requirements of new users can be accommodated, however, the full cost of making the water available will be charged. New users will have the effect of bringing the augmentation date forward. • It is important to note that abstractions from the tributaries of the Vaal River as well as groundwater abstraction in certain sub-catchments may influence water availability to downstream users as well as the overall balance in the Vaal River System. **Water Balance Perspective and measures to improve water supply in the Middle Vaal WMA:** The water balance figures quoted in this section (see table overleaf) are from the NWRS. The Water Balance figures in the NWRS are given at a coarse resolution for larger (combined) sub-catchments , the assumption being that local shortages could be supplied from nearby water resources. These figures also take account of the reserve. The reconciliation of the water requirements indicates that the water is currently and will in the future be in balance due to releases from the Upper Vaal WMA. Water users along the main stem of the Vaal River can apply for water at full cost.

Situation Assessment: (Continued)

There is limited potential for the development of local surface water resources. The water balance currently and in the future is dependent on the transfer of water into the WMA from the Upper Vaal WMA. There is currently about 829 million m^3/a transferred into the WMA from the Upper Vaal WMA according to the NWRS. The largest portion of this transferred water, 500 million m^3/a, is only conveyed through the Middle Vaal WMA to supply the requirement in the Lower Vaal WMA. **[Ref 1]**

Sub-area	Available water			Water requirements			Balance
	Local yield	Transfers in (1)	Total	Local require-ments	Transfers out (2)	Total	
Rhenoster-Vals	44	1	45	54	0	54	**(9)**
Middle Vaal	(142)	828	686	129	559	688	**(2)**
Sand-Vet	147	59	206	187	2	189	**17**
Total	**49**	**829**	**878**	**370**	**502**	**872**	**6**

Source : Overview of Water Resources Availability and Utilisation, 2003

(1) The Middle Vaal utilises excess supply in the Upper Vaal River System.

(2) The Middle Vaal WMA has a large commitment to the Lower Vaal and Lower Orange WMAs.

Middle Vaal Sub-area

The NWRS indicates an approximate overall balance for the "Middle Vaal" sub-area, which incorporates Schoonspruit and U/S Bloemhof sub-catchments. The U/S Bloemhof Sub-catchment effectively comprises the Vaal main stem as it traverses the Middle Vaal WMA. The discussion surrounding the main stem of the Vaal River is therefore discussed under the U/S Bloemhof sub-catchment.

U/S Bloemhof Sub-catchment:
Wolmaransstad and Wesselsbron are the most important urban centres in the area. There is no significant irrigation in this area. Consumptive requirements by urban and rural users within this catchment are therefore small (3%) in comparison with non-consumptive requirements such as the ecological Reserve. River losses is also a significant factor that affects the water balance within this sub-area. However, as this sub-catchment is located on the main stem of the Vaal River, the water requirements of this area are provided by releases from the Upper Vaal WMA.

Releases from the Upper Vaal WMA into the Middle Vaal WMA is driven by demand in the Middle Vaal WMA. The conditional surplus that exists in the Upper Vaal WMA therefore implies that water availability in this sub-catchment is not a problem. This sub-catchment also transfers water from the Vaal River to a number of adjacent sub-catchments to supply urban users as well as the mining sector, for example the transfer of water to the Free State Goldfields in the Vet sub-catchment. River losses play a significant role in the water balance of this sub-cachment.

Schoonspruit Sub-catchment:
The area is rural in nature and has significant controlled irrigation and rural requirements. Ventersdorp and Coligny are the most significant urban centres in the northern parts of the area.

The main urban centres in the south of this subcatchment are Klerksdorp, Orkney and Stilfontein in the NW Goldfields and Odendaalsrus in the Free State. The requirements of Stilfontein, Buffelsfontein, Vaal Reefs and Hartebeesfontein Gold

Situation Assessment: (Continued)	Mines make up over 90 % of bulk requirements in the area. Effluent returns from these towns and mines increase the water resources availability of the area significantly. This area is characterised by significant groundwater resources and the interaction between surface and groundwater in this area needs to be better understood (See **A1.1 : Water Availability Strategy**). **Rhenoster-Vals Sub-area** The NWRS reports an overall shortage of 9 x 10^6 m^3/a for the Rhenoster-Vals sub-area. The shortage is due to the large proportion of irrigation water use that is present in this sub-area. Irrigation is however supplied at a relatively low level of assurance. *Rhenoster Sub-catchment* This sub-catchment is rural in nature and has significant controlled irrigation and rural requirements (87 % of total requirements). Heilbron and Viljoenskroon are the most significant urban centres in the area. Water is transferred from the Upper Vaal WMA (Vaal Dam) to supply the needs of Heilbron. There is an initiative in progress to investigate the possibility of buying out irrigation rights from Koppies Irrigation Scheme for a diamond mining development near Viljoenskroon. The mine has undertaken a groundwater availability assessment and, according to their findings, there is inadequate groundwater resources to support the requirements of the mine. The current water resource simulation models, with possible increases in the network resolution, should be used to assess the water resource availability of different scenarios. *Vals Sub-catchment:* While the sub-catchment is rural in nature, it has significant urban requirements. The urban requirements are dominated by the requirement of Kroonstad. Serious water shortages are currently being experienced in this sub-catchment, specifically at Kroonstad. Kroonstad's first option is to initiate WC/WDM measures to alleviate the water shortage problem. The second option would involve resource development that will result in the reduction of the yield of the Vaal River System, thereby attracting the Vaal River tariff. A third option would be the investigation of groundwater resources to augment existing surface water supplies. Other relevant issues in the catchment include: 1. The water requirements of Bothaville is supplied by Sedibeng Water with water from the Vaal sub-catchment (Vaal River). 2. Treated sewage and stormwater returns, from Kroonstad in particular, contribute to the water resources of the Vals sub-catchment. **Sand-Vet Sub-area** The NWRS indicates that the Sand-Vet area (which includes the Vet, Erfenis and Allemanskraal sub-catchments) has a surplus of 17 x 10^6 m^3/a. There are uncertainties about this supply, viz. where this surplus exists or whether it is consumed by river losses, etc. Water is also reportedly over-allocated in this sub-catchment, implying that further analysis is required before the surplus indicated in the NWRS can be allocated to users. *Allemanskraal Sub-catchment:* The sub-catchment is located upstream of Allemanskraal dam and is rural in nature. The bulk of the yield in this catchment is generated in Allemanskraal Dam and is

Situation Assessment: (Continued)	utilised downstream in the Sand River which is located in the Vet sub-catchment. Senekal is the most important urban centre in the area and is supplied from the Syferfontein and De Put Dams. Consumptive requirements by urban and rural users make up the rest of the requirements. Irrigation water requirements are not significant. *Erfenis Sub-catchment:* This sub-catchment is located upstream of Erfenis Dam and is rural in nature with Winburg and Marquard being the most important urban centers in the area. Consumptive requirements by urban and rural users make up 31% of total requirements. There is a transfer of water from Erfenis Dam to Brandfort in the Upper Orange WMA ***[Ref 2]***. Irrigation water requirements are not significant. This sub-catchment contributes to the downstream yield of the Vet River. *Vet Sub-catchment:* The main urban centres are Welkom and Virginia and the main mines in this sub-catchment are Harmony, President Steyn, African Rainbow Minerals and Bambanani Gold Mines. Return flows from these users contribute about 10 % to the water resources of the sub-catchment. Sedibeng Water has a significant network of reservoirs, pump stations and pipelines from the Vaal River to these main centres. The mining (30%) and urban water requirements (24%) of the Free State Goldfields dominate the water requirements of this sub-catchment ***[Ref 2]***. Irrigation water requirements (40%) for controlled irrigation are significant and are the most important in the WMA as a whole. Approximately 122 km^2 is scheduled for irrigation in three areas, namely Sand-Vet GWS (Sand), Sand-Vet GWS (Vet) and Vet River GWS. Actual irrigation requirement are significant therefore this sub-catchment does not contribute to the yield of the Lower Vaal WMA. Sedibeng Water has an allocation of 12 million m^3/annum from Allemanskraal Dam. Their purification plant, using water from Allemanskraal canal system, is only ± 20% utilized. Due to economic benefits related to pumping and treatment costs as well as their spare capacity at their Allemanskraal purification plant, Sedibeng Water has expressed the need to maximise their supply from Allemanskraal Dam. An investigation is required to determine whether a surplus exists at Allemanskraal before any further allocations can be made to Sedibeng Water from Allemanskraal Dam.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1**. A detailed assessment of the Sand/Vet sub-area is required to verify the surplus of 17 x 10^6 m^3/a (as reported in the NWRS), before further allocations can be made.	Regional Office (Priority 1)
	M2. WC/WDM must be encouraged in local authorities experiencing water shortages and any development of water resources that is required must be at the Vaal River tariff. This approach must be used in all areas experiencing water shortages, in particular, Kroonstad.	Regional Office (Priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302 3. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF report no : P C000/00/18496	

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A.1.5 COMPULSORY LICENSING

Management objective:	Ensure equitable sharing of the available water resources for the Reserve and activities to maintain the economic and social structures that rely on the water resources of the Middle Vaal WMA.
Situation Assessment:	As discussed in the Vaal Overarching ISP, there is no immediate need to undertake a compulsory licencing process for the Vaal River System in terms of: a. Equity b. Water Balance c. Ecological Reserve <u>Equity</u> The specific need to move water into the hands of the historically disadvantaged is not seen as the focus in the Vaal River System and there are no immediate pressures in this WMA to make allocations to Black farmers. Indirectly, by supporting the economic activities, secondary opportunities are created in the form of revenue for government that can be allocated to worthy causes such as land restitution. As far as the Middle Vaal WMA is concerned with regard to addressing inequities of the past, if equities are to be addressed through irrigation, land will have to be gained through the redistribution of existing land under irrigation. The economics of irrigation dictate that the land will have to be close to water. In addition, with the general movement of people from rural areas to the urban centres, water could become available for emerging farmers. Alternatively water can be made available through a compulsory licencing process. The possibilities in this area need to be investigated. <u>Water Balance</u> In terms of water balance, the system is in balance in terms of water availability and water requirements as any additional water requirements can be made available through releases from the Upper Vaal WMA as a result of the conditional surplus that exists in the Vaal River System. Therefore, in terms of the water balance of the system compulsory licencing is not a priority within this WMA. <u>Ecological Reserve</u> The economic activities supported by the water resources in the Vaal River System are recognised as the economic engine of South Africa and the Vaal River is considered to be a “work horse” river in terms of the Ecological Reserve. However the Ecology of the river should be managed to prevent further degradation and improve areas where unacceptable ecological conditions exists without causing a significant reduction in the water availability (Refer also to the **Vaal River System Analysis Update Study** ***[Ref 2]*** with regard to Ecological Reserve Management). There are no sensitive areas downstream of the main dams within the Middle Vaal WMA implyng that there is no urgent need for the determination of a Comprehensive Reserve and full implementation thereof. Although the above status indicates that Compulsory Licensing is not an immediate priority in the whole WMA, it may be required in selected sub-catchments where specific issues were raised at the workshops, for example, the Klerksdorp and Ventersdorp areas as well as the Schoonspruit Groundwater Users are considered to be over-allocated at present and compulsory licensing may alleviate this problem.

	However it is considered that other interventions (such as verification of lawful use and implementation of WC/WDM) must be explored to address the specific problems before a compulsory licensing programme is pursued.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1**. Evaluate the priority of compulsory licensing for localised stressed catchments. The use of regulations to solve the problems listed above should be investigated prior to considering compulsory licensing.	Regional Office (Priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF report no : P C000/00/18496	

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A.1.6 SUPPLY TO DISTRICT AND LOCAL MUNICIPALITIES

Management objective:	Ensure that local and other authorities have sufficient water resources to supply their requirements and that they implement measures for efficient utilisation of the available resources. The objective with water supply to local authorities should be to implement economically feasible supply options with acceptable environmental impacts.
Situation Assessment:	**Appendix C** provides a list of all towns within the Middle Vaal WMA and their water sources, as well as particular water resource-related problems experienced within certain towns. **Surface water resources:** The water requirements for the Middle Vaal WMA are modelled as part of the water balance of the Integrated Vaal River River System. This balance considers availability and demands on a catchment-wide basis and deficits in water availability are often not identified at a local level. In order to obtain a broad indication of the supply situation at a local level, basic water balances at quaternary scale needs to be compiled. A large number of towns within the Middle Vaal WMA is supplied by MidVaal Water Company and Sedibeng Water with water from the Vaal River. The remaining water requirements are supplied by local resources. In general the areas supplied by Sedibeng Water and MidVaal Water Company do not experience problems with water supply but the smaller towns need to investigate water resources availability and supply alternatives for their towns. During 1995, Sedibeng Water supplied about 34 x 10^6 m^3 to about 514 000 people in the Middle Vaal WMA and MidVaal Water Company supplied about 19,4 x 10^6 m^3 to about 300 000 people in the Middle Vaal WMA, all within the North West Province. **[Ref 2]** Sedibeng Water and MidVaal Water Company draws their water from the Vaal River where there is a surplus. There is a concern that towns supplied by Sedibeng Water and Mid Vaal Water Company will not use water efficiently as a result of the relative surplus in availability of water through these water service providers and the fact that the financial viability of these institutions is based on increased water sales. This issue needs to be considered in any further water allocations to these Water Service Providers (WSPs) with a view to implementing the full Vaal River tariff for additional allocations. Sedibeng Water and MidVaal Water Company must also be encouraged to promote WC/WDM. **Groundwater Resources:** The water requirements of a number of small urban centres as well as certain irrigation requirements in this WMA are supplemented by groundwater. Where water resources are stressed, management action/s in the following order of priority is recommended: 1. Consider WC/WDM 2. Investigate local ground and surface water resources 3. Consider trading of water rights

Situation Assessment: (Continued)	Water Conservation/ Demand Management Another important role that the Department/CMA must pursue is the implementation of effective WC&DM measures in the WMA. This must be pursued both with the local authorities and Sedibeng Water and/or Midvaal Water Company. In addition, the difficulties in stressed catchments can also be relieved through optimising operations. It is understood that system losses is a significant factor in the water balance of a system and reducing losses will increase water availability for allocations. Investigate Local Water Resources The approach to be adopted with the towns reliant on local water resources, is that the Department/CMA together with Sedibeng Water or Midvaal Water Company, where appropriate, will give guidance on the approach to follow and the possible supply options that should be investigated. The towns will then apply for a licence through the normal channels. In addition, consideration must be given to investigating transfer of water resources from areas adjacent to the towns in question to determine whether water requirements of these towns can be sourced from the adjoining areas. Trading of Water Rights The Department/CMA can also consider trading of water rights where water resources are stressed. Water rights can be traded from other users and/or adjacent sub-catchments before consideration is given to augmentation of water from the Vaal River System at full cost.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1**. Promote the implementation of WC/DWM measures within local authorities.	Regional Office (As required)
	M2. Promote and encourage the utilisation of groundwater resources for local water resource development. Water Service Development Plans and feasibility studies (business plans) should indicate what groundwater supply options were considered for development.	Regional Office (On-going)
	M3. Regularly update information with regards to the water sources of towns not supplied from the main water supply systems. List the towns with inadequate water resources and inform and guide these towns on undertaking yield analysis of these catchments supplied from local resources (both surface and groundwater).	Regional Office (Priority 1)

	M4. Provide water resource availability assessments for areas where extensions to the water resources are required (to be considered only for towns that are financially stressed, eg. Assistance may be provided through exploratory drilling, etc.). The need for this information should be identified in the WSDP development process and the results should be included in the WSDP reports.	Regional Office (As required)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302	

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A.2 WATER RESOURCES PROTECTION STRATEGY

A.2.1 RESERVE AND RESOURCE QUALITY OBJECTIVES

Management objective:	A Comprehensive Reserve determination needs to be undertaken for the Vaal River catchment, with the Reserve being implemented and enforced.
Situation Assessment:	A new classification system to ensure a balance between environmental health and the optimal use of the resource is under development and the rivers in the Middle Vaal will need to be classified under this system. As indicated in the Vaal Overarching ISP report, the Vaal River Catchment has sub-catchments whose natural flow and water quality regimes are significantly changed from natural conditions, whilst others are close to natural. The impacted river systems in the Vaal River catchment are highly regulated by major and small dams. The natural flow patterns in many of these river reaches have been substantially modified by return flows from wastewater treatment plants, mine dewatering, agricultural return flows and releases of water from transfer schemes into the river systems. It is expected that the ecosystems have largely adapted to the changed flow and water quality regimes. There are also substantial areas of the Vaal River catchment where land use development is low and the flow patterns are therefore largely unimpacted. A Comprehensive Reserve has not been determined for the Vaal River Catchment. However, as part of the VRSAU study an Environmental Flow Management Plan was developed for the main stem of the Vaal River **[Ref. 1]**. The products from the study were basic definitions of flow requirements and preferred operating regimes. Currently applied reservoir release and transfer operating rules do not explicitly contain the flow requirements defined in the abovementioned study. The RDM Directorate has also determined low confidence rapid estimates of the IFR and in some cases the water quality Reserve for critical catchments where the Reserve is needed for the issuing of licences. The water resources of the Vaal River System are augmented by transfers into the catchment from other WMAs. The Reserve still needs to be determined for many of the catchments supplying the Vaal River System. The implementation of these Reserves and the Vaal River System Reserve will affect water availability in the Vaal River System. The impact of the implementation of the Reserves for the various augmentation schemes in the Vaal River System will have to be derived and an implementation schedule determined. The current operating rules of the Vaal River System has been applied for a long time without having major negative effects on the ecology. (No serious ecological problems were highlighted at the workshops). An environmental Flow Management Plan has been developed for the main stem of the Vaal River and the implementation thereof will be an overarching function for the National Department **[Ref 1]**. Given the above-described situation, there is no urgent need to implement the Reserve in the Middle Vaal WMA.

Situation Assessment: (Continued)	*The following requirements and guidelines have been identified in terms of Resource Directed Measures at the ISP workshops :* **1.** Reserve determination investigations are required for the following purposes: • To determine the share of water availability required for the Reserve. • For issuing of licences. • To determine when the next large augmentation scheme has to be implemented. **2.** It has been identified that the planning activities for the implementation of the Reserve in the Integrated Vaal River System should be undertaken across WMA boundaries (as described in the **Overarching Vaal ISP, Strategy A.2.1 : Reserve and Resource Quality Objectives**). This approach is necessary to ensure the combined impact of the Reserve in the different water resources (located in different WMAs) is taken into consideration in the Reserve determination process. **3**. The impact of the revised EWR's on the supply capability of the Integrated Vaal River System needs to be determined. This issue is addressed in the Overarching ISP. (See **Strategy Table A2.1 : Reserve and Resource Quality Objectives**). **4**. In most instances a rapid reserve determination must be carried out while an intermediate reserve will be undertaken only in selected areas. **5.** Groundwater reserve table is available from the Directorate : Resource Directed Measures. The Directorate : Resource Directed Measures has developed a database of all areas where groundwater Reserves have been determined. This information should be used to direct the procedure that has to be followed when assessing licence applications.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1**. The time schedule for determining the Comprehensive Reserve is needed for the Vaal River. A committee needs to be established to assess if the Reserve for the entire catchment and or system needs to be determined or only sections of the catchment and when should this determination take place. This determination should be co-ordinated with catchments augmenting the Vaal River System and the determination of the Orange River Reserve. It is dealt with in the **Overarching ISP**.	NWRP (Priority 1)
	M2. The determination of an intermediate reserve is in progress as part of the CMS study for the Schoonspruit catchment.	Regional Office (Current)

	M3 The RDM Directorate should investigate what the status of the Environmental Flow Management Plan is with respect to current Reserve Determination methodologies. Furthermore the implementation of the conditions and flow requirements into the operating rules of the system should be investigated and the impacts determined. The intention is to establish if the Environmental Flow Management Plan can be implemented as an interim measure prior to the determination and implementation of the Comprehensive Reserve for the Vaal WMAs. This issue is also being dealt with in the Vaal Overarching ISP Report.	RDM (Priority 1)
References:	1. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF Report No : P C000/00/18496	

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A.2.2 WATER QUALITY MANAGEMENT STRATEGY

Management objective:	The Department has a mandate to manage water resources in a sustainable manner. In other words, it realises that in its pursuit to stimulate development and socio-economic growth, that there will be a negative water quality impact on our environment. The main objective is therefore to ensure a sound and reasonable balance between development impacts and the protection of the resource. Fitness for use by all users (especially downstream users) and protection of the natural ecosystems must be used as the basis for strategy development
Situation Assessment:	The water quality situation in the Middle Vaal WMA is discussed in terms of the main stem of the Vaal River, which runs through the WMA and the tributaries discharging to the Vaal River. **Background** The Vaal River catchment is a cascade of three WMAs. The water quality of the main stem of the Vaal River in the downstream WMAs is therefore impacted on, not only by the activities in the WMA itself, but also by the water received from upstream. The water quality in Vaal River will also impact on the water quality of the Orange River in the Lower Orange WMA. A water quality management strategy can therefore not be developed in isolation for individual WMAs but the entire Vaal River System will have to be considered in an integrated manner. Integrated Water Quality Management Plans will therefore be developed for the Vaal and Orange Rivers. The management actions related to the development of these plans are discussed in the **Vaal and Orange Overarching ISPs**. The approach adopted by the Department of Water Affairs and Forestry in managing the water quality in the Vaal River catchment is to set water quality objectives (WQO) for the sub-catchments. The WQO are based on the water user requirements in the catchments. The WQO include ideal, tolerable and unacceptable objectives for the water quality variables. A phased approach has been adopted for the development of strategies to manage the water quality in the sub-catchments of the Vaal River Catchment. The first phase is a situation assessment, which is followed by further phases to develop catchment management strategies. The approach adopted for the management of the water quality in the WMA is on a key area basis. A CMS has been developed for the Sand-Vet and phase 2 has been started to develop a CMS for the Schoonspruit-Koekemoerspruit River system. These plans involve the setting of water quality objectives (WQO), identification of pollution sources, modelling and the development of management actions. These plans for the individual areas need to be linked to an assessment of the overall water quality management of the Vaal River. **Vaal River Main Stem** The water quality issues in the Vaal main stem are largely related to salinity and eutrophication. Complaints have been received from Water Boards regarding elevated salinity in the water supplied to their users. The presence of hyacinth on the main stem is an indication of the elevated nutrient levels in the river.

Situation Assessment: (Continued)	The water quality of the main stem of the Vaal River is not only affected by the water quality of the flow from the tributaries within the WMA but also by the water quality of the water received from the upstream Upper Vaal WMA. As discussed in the **Vaal Overarching ISP**, the water quality in the main stem Vaal in the Upper Vaal WMA is actively managed. Releases are made from Vaal Dam to maintain the TDS concentration in the Vaal Barrage at 600 mg/l. The water quality received from Upper Vaal WMA is considered to be relatively poor particularly as regards nutrients. There is also the carry over of hyacinth to the Middle Vaal WMA from the Upper Vaal WMA. The water quality of the Vaal main stem is impacted on by mining activities in the Schoonspruit, Koekemoerspruit and the Sand-Vet systems. The sources are mine dewatering discharges and seepage from tailings dams located close to the Vaal River. **Tributaries** The water quality situation in each of the three sub-areas in the WMA is discussed in the following sections. There are however two water quality related issues common to the three sub-areas. These are :- • Many of the sewage works and sanitation systems of the towns in the WMA are inadequate and are in a poor state. The reasons for this are both poor management and the overloading of the plants and reticulation systems. The overloading is sometimes due to the replacement of pit latrines with water borne sewerage systems without upgrading the sewage works. There is a practice of disposing of treated sewage effluent to mains. This practice is to be discouraged in future and the effluent treated to a suitable level for discharge back to the river. • There are significant areas of irrigation in the WMA. There is uncertainty about the water quality and volumes of the return flows associated with the irrigation areas. Groundwater is used as a source of water in many places in the WMA for both domestic and irrigation use. The protection of the water quality of the groundwater resource must be communicated to the Water User Associations (WUA). **Rhenoster Vals Sub-area** Agriculture is the predominant land-use in this sub-area. The major town in the sub-area is Kroonstad. The water quality in this sub-area is good with some localised problems associated with the management and maintenance of the sanitation system in Kroonstad, having a local impact on the water quality of the Vals River. A diamond mine is being re-established in the Rhenoster catchment. The water quality issues related to this mine will be managed through the EMPR process and water use licences. **Middle Vaal Sub-area** The predominant land uses in this sub-area are agriculture and mining. There are significant urban areas associated with the towns of Klerksdorp and Stilfontein. The mining is located in the Schoonspruit and Koekemoerspruit catchments. The water quality in this sub-area is good except for the discharges from the Schoonspruit and Koekemoerspruit catchments, which are impacted on by mining. The mining activities impacting on the water quality are mine dewatering discharges and the seepage from tailings dams. A priority list for the rehabilitation of tailings dams has been drawn up in consultation with the mines. The rehabilitation programme is in the process of being implemented.

	A study is underway to develop a catchment management plan for the Schoonspruit and Koekemoerspruit catchments. This will result in the setting of WQO, waste load allocations and monitoring programmes. The catchment plan will also determine post closure decant volumes and qualities and develop an appropriate management strategy to deal with these. There are also a number of diamond diggers ("delwers") causing sediment pollution along the Vaal River, Bamboespruit and in the Wolmaransstad area. The diggers move around rapidly and are difficult to control. They often mine without the required licences and EMPR being in place. The dolomitic compartment in the upper reaches of the Schoonspruit catchment above Johan Neser Dam is used extensively for irrigation. Groundwater management plans are being developed for this area, which will result in the setting of resource quality objectives and address the protection of the water quality of the groundwater resource. **Sand/ Vet Sub-area** The predominant land uses in this sub-area are mining and agriculture. There are large urban areas located in the mining towns of Welkom and Virginia. A water quality management plan has been developed for the Sand-Vet system as part of the Catchment Management Strategy (CMS) for this sub-area. A forum of the key stakeholders has been set up and is active in water resource management in the sub-area. The management plan established a number of reaches in the river system for which WQO have been set. A compliance monitoring program has been established. The CMS has been implemented over the past five years. The time is now appropriate to review the management plan and compare WQO with the compliance monitoring results. The plan should be revised if necessary and be integrated into the Integrated Water Quality Management Plan for the Vaal River catchment.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** The EMPR process and water use licences must continue to be used to manage mines.	Regional Office (ongoing)
	M2. RQOs need to be set to protect the groundwater and surface water. The RQOs should be set for the different geological types in focus areas within the WMA.	Regional Office (ongoing)
	M3. The existing communication structures at the local government and provincial levels should be used to communicate the Department's concerns about the sanitation systems in the WMA.	Regional Office (ongoing)
	M4. The implementation of the Sand-Vet CMS should be continued. A review of the success of the implementation of the Sand-Vet CMS should be undertaken. The CMS should be further developed so that it integrates into the Integrated Vaal River Water Quality Management Plan.	Regional Office (priority 1)
	M5. Working for water needs to start with a clean up program for the hyacinth in the Vaal River main stem and the tributaries.	Regional Office (priority 1)

	M6. The water quality and land use changes in the remaining key areas should be monitored and a detailed CMS developed when required	Regional Office (priority 1)
	M7. The Department needs to develop a communication strategy with the WUA to provide information on issues such as recommended values for fertiliser applications to protect groundwater quality.	Regional Office (priority 1)
	M8. Communicate with mines through Forums on the progress with the implementation of the rehabilitation plans.	Regional Office (priority 1)
	M9. The licensing process should be used to control the treatment levels and points of discharge of sewage treatment plant effluent.	Regional Office (priority 1)
	M10. Actively participation in the Water Quality Overarching study.	Regional Office (priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Internal Strategic Perspective : Vaal River System : Overarching, 2004. DWAF Report No. P RSA C000/00/0103.	

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A.3. WATER USE MANAGEMENT STRATEGY

A.3.1 GENERAL AUTHORISATIONS

Management objective:	To optimise the use of these authorisations with a view to cutting down on unnecessary administrative efforts of water use activities that can be allowed without individual water use licences. Both the DWAF and the users falling in the General Authorisation category would save resources (time and money) by not having to apply for and process licenses for certain water use activities.
Situation Assessment:	The local water resources in the Vaal River System is limited with the result that local water resources are augmented by large scale transfers from the Thukela–Vaal Scheme and the LHWP. Consequently there are no general authorisations for the following water uses: a. Abstraction of surface water throughout the Middle Vaal WMA b. Abstraction of water from Ventersdorp Groundwater Scheme c. Storage from runoff In terms of Section 39 of the NWA, General Authorisations are permitted for the following in the Middle Vaal WMA **[Ref 1]**: a. Groundwater abstraction, at a maximum rate of **60m^3** per hectare per annum, in quaternary catchments C24B, C25B,C,E,F, C41F,G,H,J, C42L, C43, C60G,H,J, C70C,D,E,F,G,H,K. (See **Appendix C** for Map indicating quaternary catchments). b. Groundwater abstraction, at a rate of **300m^3** per hectare per annum, in quaternary catchments C24, C25A,D, C41A,B,D,E, C42A,B,C,D,E,F,G,H,J,K, C60A,B,C,D,E,F, C70A,B,J. c. Irrigation with wastewater, except within the Ventersdorp Groundwater Scheme. d. Treated effluent up to a maximum of 2 Ml/day is permitted provided that certain quality limits and monitoring requirements are met. e. Disposal of domestic sewage up to 1Ml/day provided that certain conditions and limits are satisfied. f. Removal of groundwater (for purposes such as mining) up to a maximum volume of 50 Ml/day. All other activities are not covered by general authorisations but applications are currently being considered to permit GA's for the following: a. Impeding or diverting flow up to certain limits. b. Altering the shape of the river bank (with limits). The following requirements have been identified in terms of General Authorisations: **1**. Smaller feed lots need to be included under General Authorisations. The bearing capacity of the property needs to be taken into account. There is currently a process underway at a National Departmental level to develop the criteria for this water use.

Situation Assessment: (Continued)	**2**. Consideration needs to be given following further investigations to relaxing requirements for general authorisations for Wastewater Discharge for specific types of sewerage works in specific areas. The volume restrictions in this WMA need to be waived or adjusted as follows: • For higher value oxidation ponds, increase from 1,0 to 1,5 Ml/day • For sewage plants, increase minimum requirement from 2,0 to 3,0 Ml/day **3.** Consideration needs to be given to the fast-tracking of licensing for mine diggers or including under General Authorisations. **4.** General Authorisations need to be reviewed on a regular basis. In conclusion, it is recommended that the responsibility for the reviewing and future publication of General Authorisations should be the function of the CMA, currently the Regional Office. The implementation of this delegated responsibility is currently being considered by the National Department for application in all WMA's.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** Review and **r**efine the conditions specified for General Authorisations on a regular basis to incorporate the abovementioned requirements and other necessary adjustments.	Regional Office (Priority 1)
References:	1. National Water Act , 1998	

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A.3.2 LICENSING STRATEGY

Management objective:	Licensing of water use (as defined in the National Water Act) should be considered on a continuous basis when applications are received. The licences should be considered in accordance with the framework as presented below:
Situation Assessment:	Although there is little or no growth in water use forseen in this WMA, the licensing of current and new users is still an important water resource issue facing the WMA, so too is the licensing of water discharges (e.g. urban effluent returns, mines decanting ground water etc) into the surface water system. The issuing of new licences is dependent on whether the surface water resources can meet the existing and future requirements as well as ecological and social reserve requirements. Therefore, In order to ensure that the licencing process is meaningful and to ensure that licences are not over-allocated, it is recommended that a comprehensive database of water users be created and maintained with all licensing details in this WMA. **Considerations for water abstraction licences:** Due to the "conditional" excess water available in the Vaal River System (see **Strategy A.1.3**) the issuing of licences for water abstraction could be considered under specific conditions as listed below **[Ref 1]**. This opportunity for new licences is made possible only as a result of the transfer of water into the system, which implies that the full cost of the water will have to be charged for the intended user. Because water is transferred into the system and is available not only to users in the Vaal WMAs, but also to users in other WMA's, the allocation of the surplus will remain under DWAF's national control. *Directives and guidelines to apply when evaluating new licences to be allocated from the conditional surplus:* • No new licence application will be considered unless water conservation and demand management is satisfactorily practiced and proved. This will apply to all users. • An applicant with direct (mainstream) access to transferred water will be able to receive a licence for water abstraction at the full cost. • An applicant with indirect access to transferred water will be able to receive a licence for water abstraction at a cost to be determined by the impact of the abstraction on the water resource. • An applicant will be able to receive a license for water abstraction at the applicable pricing structure provided that one can prove the availability of the resource. • Water quality impacts of any new licence must be considered. • When the trading of water rights is considered, the net impact of the water users involved needs to be taken into consideration . The existing trading policy on in- sectoral trading should be applied. A draft trading policy and mechanism has been developed for inter sectoral trading and across WMA trading, and is awaiting approval from the DG. • Included in draft trading policy is that trading of water rights should only be allowed in cases where the water resource is clearly shared by trading users and, should they have different reliability requirements, that they be based on equal impact on the water resource.

Situation Assessment: (Continued)	**Status with respect to Discharge Licenses:** Applications for discharge licences will be addressed through the licencing procedures. The forms will be accompanied by the required support documentation, which includes an impact assessment. Where a CMS is available, the WQO and any other conditions contained in the CMS will be used to evaluate the application. Where a CMS is not available, WQO will be set based on a water user survey and an ecological assessment of the receiving water body. Upon completion of the planned Integrated Water Quality Management plan for the Vaal River Catchment, the CMS and WQO developed for the sub-catchments may have to be refined based on the integrated plan. This could mean that the discharge licences issued need to be reviewed.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** Assess the current database in terms of licensing information requirements and make recommendations for improvement.	Regional Office (Priority 1)
	M2. Apply licencing procedures outlined in the above situation assessment	Regional Office (Priority 1)
References:	1. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF Report No : P C000/00/18496	

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A.4 WATER CONSERVATION & WATER DEMAND STRATEGY

A.4.1 WATER CONSERVATION & WATER DEMAND STRATEGY

Management objective:	To make more effective and efficient use of the existing available water resources in all water user sectors. This will enable the Catchment Management Agency (and indeed DWAF) to conserve this scarce resource and avoid expensive schemes for transfers and storage when these may not be necessary if demand is properly managed.
Situation Assessment:	**Overview** Evidence of inefficient water usage can be found in all water use sectors throughout the country and the value of water seems largely unrecognised by many water users. South Africa is a developing country that is water stressed and requires improved management of its limited water resources. The implementation of water conservation and water demand management principles is essential in meeting the national goals of basic water supply for all South Africans and the sustainable use of water resources. Irrigation is the main water user in this WMA and water conservation and demand management should be focussed on this user group to obtain maximum savings. Significant savings can be obtained by reducing conveyance losses in canals, proper irrigation scheduling, metering and pricing of irrigation water and the improvement of irrigation systems. For example, the removal of alien vegetation is considered to be an important step towards the reduction in conveyance losses. Although urban/industrial uses is a relative small component in this WMA, Water Conservation and Demand Management Programs or strategies for urban centers need to be reviewed and if not available, designed as it has a significant impact in some of the sub-catchments. These programs need to resolve issues related to conveyance losses, to Unaccounted for Losses, to re-use and to return flows. These programs must include surface water and groundwater pollution mitigation strategies that will require monitoring by the CMA. The programs should set best practice norms and minimum requirements. **Middle Vaal WMA** The Schoonspruit area is an important area where WC &DM measures could have significant benefits. It has been identified that significant losses are incurred in the canals downstream of the Ventersdorp and Schoonspruit Eyes. Estimates indicate that these losses could be as high as 8 million m^3/annum on a total requirement of 32 million m^3/annum. It is proposed that the implementation of water conservation and demand management measures to reduce the losses be investigated, and if found feasible, be implemented in the supply system be assessed. WC/WDM is also being effectively practiced by farmers in the Schoonspruit sub-catchment with the result that current irrigation water use in the is less than the quota. Despite paying according to a fixed allocation, farmers in this area previously used 80% of quota and now only between 50 to 60% is utilised, due to the realisation that the existing soil conditions do not suit certain crops. More efficient farming practices are employed, for example, only one crop per annum is now produced in certain areas due to the climatic conditions in the region. This indicates that certain farmers are becoming aware that WC/WDM initiatives can

Situation Assessment: (Continued)	actually save them money. The above initiatives by farmers serve as a good example and should further be encouraged by promoting the utilisation of their savings for increasing their irrigated area, or make the saved allocations available for trading to other users (See M2 below). The current losses in the Sand-Vet system are 20% where the canals are unlined. There are proposals to construct weirs to improve operations. **Municipalities** There are currently several initiatives by Local Authorities and Service Providers around the country to implement Water Conservation and Demand Management (WCDM) measures and it is perceived that large savings could be achieved in the gross demand of the urban sector. The benefits of introducing WCWDM measures, are with respect to improving local availability, postponing capital expenditure (to extend bulk distribution systems), reducing water supply operating costs and (potentially) decrease the costs of wastewater treatment due to lower volumes of return flow. WC/WDM must therefore be promoted in this WMA.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** Creating awareness of the benefits of WCDM measures among Local Authorities as well as at the various Forums that are active in the Vaal River System.	Regional Office (Priority 1)
	M2. WC/WDM must be promoted in the agricultural sector. Farmers must be encouraged to save water by demonstrating to them that WC/WDM has several benefits for them. (eg. increase in irrigation area with same quota or trade their water savings.)	Regional Office (Priority 1)
	M3. Applications for allocation of surplus water must demonstrate Water Conservation and Demand management initiatives and the first priority of solving water deficit problems should be to implement WC/WDM. Augmentation options should only be considered if it is proved that WC/WDM will not improve the situation.	Regional Office (On-going)
	M4. Measures need to be implemented in the Schoonspruit sub-catchment to address losses in this area.	Regional Office (Priority 1)
	M5. DWAF needs to work with municipalities in stressed catchments to initiate WC/WDM measures. A set of guidelines is required to assist local authorities with formulating and implementing WC/WDM.	Regional Office (Priority 1)

References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302 3. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF Report No : P C000/00/18496

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A5. INSTITUTIONAL DEVELOPMENT & SUPPORT MAIN STRATEGY

A.5.1. LOCAL AND CATCHMENT LEVEL STRATEGY

Management objective:	The Regional Office (as the interim CMA) needs to take institutional control of all Water Resource Management functions and will be supported by DWAF Head Office Directorates. Their main objective is to responsibly manage the water resources of the Middle Vaal WMA in the interim until such time as the Catchment Management Agency can take over some of the functions.
Situation Assessment:	**General** In planning for the CMA process, the Middle Vaal WMA has been split into 7 sub-catchments. Forums have been established in 2 of the sub-catchments, namely the Schoonspruit Forum and the Sand-Vet-Allemanskraal Forum. The process to establish the others are in progress. The structure of these forums are planned and implemented by the Regional office of DWAF. They are normally made up of interested and concerned citizens, as well as the major water users, water service providers and DWAF. The function of the forums is to play an active role in the practical review and implementation of the various water resource management issues in the catchments. Problems with representivity at these forums however threaten their effective existence. Currently interested and affected parties are however included on a study basis only, mainly concerned with water quality. It is the intention to start initiating remaining forums in 2005 as the CMA process is expected to commence in 2006. Institutions at District and Local Municipal level are relatively new on the scene and water resource and water service capacity is slowly being built in these institutions. Liaison between the various institutions needs to be encouraged in the interest of integrated water resources management in the Middle Vaal WMA. Irrigation boards are currently being transformed to Water User Associations. This process will continue and these institutions will fulfil their roles in line with the NWA , WSA and the NWRS. The Klerksdorp Irrigation Board is in the process of being transformed into a Water User and the Koppies Irrigation Board is also in the process of converting into a Water User Association. The Sand-Vet Catchment Management Committee is also in the process of being formed. Other Water User Associations in the WMA include the Ventersdorp Dolomitic WUA.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** Continue assisting NGO's and CBO's in the establishment and empowerment of the local water resource management authorities. More support (especially basic financial support) needs to be considered to the founding of forums, since they fulfil a key role in the establishment of these institutions. Promotion of these forums is crucial in order to ensure that the forums are representative of all the role players / stakeholders in the catchment.	Regional Office (Priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203	

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A5.2 POVERTY ERADICATION

Management objective:	The main objective is to contribute to the eradication of poverty through the provision of basic Community Water Supply and creation of employment in developing Community Water Supply and Sanitation Infrastructure. Due to the mostly rural composition of the population and dependence on agriculture, make specific allowances for irrigation water to resource poor farmers (RPF).
Situation Assessment:	Local water resources in this WMA is limited and water is transferred into the WMA at a high cost to meet the needs of water users, particularly users that contribute significantly to the economy of the country. As set out in the licencing strategy, new water use will be supplied at full cost. Poverty eradication schemes are unlikely to be sustainable if the full cost is applied. Opportunities will therefore have to be found where the existing water allocations are made available for poverty eradication schemes. Similarly water saved through WC&DM, particularly in the agricultural sector, can be used. The Department must identify opportunities and facilitate the transfer of water allocations from the commercial irrigation sector to Resource Poor Farmers (RPF). DWAF has identified the need to implement programmes to eradicate poverty as part of government's overall objective of addressing poverty. Water is not available from surface water resources for allocation to irrigation projects but it is possible to obtain water from small farm effluent or groundwater resources. Several poverty eradication schemes to use effluent for small irrigation projects, such as woodlots, were therefore started in the Middle Vaal WMA (Wesselsbron, Bloemhof, Kroonstad & Stillfontein), but these initiatives have not been successful to date due mainly to poor soil quality and poor management. It is evident that these schemes need to be coordinated with other relevant authorities, such as the Department of Land Affairs and the Department of Agriculture, in order to ensure the successful implementation of these poverty eradication initiatives. The following requirements to alleviate poverty have been identified : **1.** The Department must identify opportunities (specifically groundwater) and facilitate the transfer of water rights from the commercial irrigation sector to RPF. **2.** The Department of Land Affairs and the Department of Agriculture should be contacted to find out if they have any plans, which the Department can support. In addition, DWAF needs to give assistance in terms of making available information on water availability in certain catchments. **3.** Resource Poor Farmers need to be encouraged to form WUAs in order to obtain subsidies from DWAF. 4. Implement standard poverty eradication principles in the managing and administrating of water supply schemes funded by DWAF. 4. Poverty Eradication should be included, as far as possible, in any new developments funded by DWAF.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** Actively pursue the implementation of poverty eradication initiatives in the process of providing water supply and sanitation systems in rural areas.	Regional Office (On-going)
	M2. If these poverty alleviation schemes are shown to be feasible, the Department should encourage and facilitate transfer of water rights from the commercial irrigation sector (via trading), facilitate the submission of the necessary licence applications and formation of the required institutional structure.	Regional Office (On-going)
	M3. Collaboration with the Departments of Land Affairs and Agriculture in terms of schemes relating to Equity farmers.	Regional Office (Priority 1)
	M4. Encourage RPFs to associate with or form WUAs in order to qualify for subsidies and incentives in the pricing policy.	Regional Office (Priority 1)
References:		

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A.6. ENVIRONMENTAL STRATEGY

Management objective:	Ensuring that there is a balance between the need for development (i.e. including all activities undertaken by DWAF) and the need to protect the natural and social environment for the benefit of all.
Situation Assessment:	DWAF has been very proactive over the years regarding the institution of international best practice in the field of Integrated Environmental Management. The Directorate: Water Abstraction and Instream Use has recently published the Department's Environmental Implementation and Management Programme and is currently developing specific strategies to implement processes that will take due consideration of all impacts that water resource and other water management activities will have on our broader environment in which we live. There is a current drive to determine the Reserves and Resource Quality Objectives of all rivers in the WMA in order to facilitate the licensing process as well as effective water management. There is also a need to operationalise the Reserve and Resource Quality Objectives once they have been determined. In an effort to properly manage the environment, all the mines are forced to have an EMP in place for their on-going operations as well as for mine closures. EMPs are also required for the small diamond digging operations. Biomonitoring is currently carried out by the Department for the Sand-Vet, Vals and Schoonspruit sub-catchments.

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A.7 WATER SUPPLY INFRASTRUCTURE DEVELOPMENT & MANAGEMENT STRATEGY

A.7.1 SYSTEM MANAGEMENT STRATEGY

Management objective:	Implement system management measures to optimally utilise the available water resources, in terms of short-term benefits and to maintain the reliability of supply over the long-term. The aim is to postpone the need for the development of new costly infrastructure for as long as possible into the future while saving operating costs over the short-term.
Situation Assessment:	***General*** There are no major industries or operational power generation facilities in this WMA. Mining and agriculture are the primary economic activities occurring in this catchment **[Ref 1]**. General trends in the Middle Vaal Water Management Area are the continued concentration of economic development and population in the urban centres and mining districts, and a decline in rural population. Mining water requirements have also decreased due to a general decline in mining activity in some areas and more efficient water use by mines in other areas. The net result is an expected decline in water use in the catchment. The Middle Vaal WMA is part of the Vaal River System. This system is supported by water supply infrastructure located in surrounding WMAs and countries. Any future growth in the water requirements of the Middle Vaal WMA will be met by transfers. The planning of the future infrastructure development and implementation is discussed in detail in the Vaal and Orange Overarching ISPs. For details these reports should be consulted. **Vaal Sub-catchment** There is an operational problem at the Balkfontein abstraction point as storage at the Balkfontein weir is too low. Consequently releases from the Vaal Dam need to coincide with actual water requirements in this catchment to ensure that the weir does not overflow or that water shortages do not occur. Sedibeng Water also enjoys a conditional water use from Allemanskraal when the dam is overflowing, provided that the reserve requirements are catered for. This water is cheaper and of a better quality than water from the Vaal River. **Responsibility** There is a need to centralise system management to some extent, i.e. it should be controlled by National Government. This is essential to ensure that control of national water resources is not in the hands of a WMA. Operational issues relating to blending, releases, etc. are overarching in nature and therefore should be controlled by National Government. The operation and management of local resources, such as tributary dams, will be the responsibility of the CMA.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** The operation of the system to control the flow in the main stem of the Vaal River System is planned for by annual operating analyses that is an overarching function of the National Department. The DWAF Regional Office has to participate in the annual operating analysis to determine the operating rules to apply for specific supply situations to ensure that the required management measures are implemented timeously.	Regional Office (on-going)
	M2. Determine and implement operating rules for the tributary dams in this WMA, including Allemanskraal, Erfenis, Johan Neser, etc. Although water restrictions in the Vaal River System is an overarching issue which will be dealt with at National level, the CMA can implement restrictions that only affects users from a local resource, viz. tributary dams.	Regional Office (Priority 1)
References:	1. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302	

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A.7.2 RECREATION ON DAMS & RIVERS STRATEGY

Management objective:	To regulate recreation on all water bodies in the catchment, but also to restrict access to levels that do not negatively impact on the natural environment or on the local population. Developments must adhere to guidelines and criteria specifically prepared for recreational purposes. These developments must be evaluated on a consistent basis taking into account the need for such a development as well as the implications on the environment, current water users and public safety.
Situation Assessment:	All the water bodies are important for recreational purposes, especially in the interior of South Africa. There are several recreational sites located in the Middle Vaal WMA, viz. Schoonspruit Dam, Rietspruit Dam, Schoonspruit, Kroonstad, Virginia Boat Club, Vaal Reefs Nature Reserve, Bloemhof Dam Nature Reserve, Willem Pretorius at Allemanskraal Dam, Koppies Dam, Erfenis Dam nature reserve, Orkney Vaal, Faanmeintjies near Klerksdorp & Stilfontein ,etc. **[Ref 1]** The Directorate: Social and Ecological Studies have fairly sophisticated processes to determine the impacts of recreation on water bodies and to promote recreation and tourism within realistic frameworks. *The following information is also crucial for this WMA in terms of recreation:* **1.** It is important that the dam sites located in the Lower Vaal be exploited for recreational use **2.** The rezoning of these sites for recreation and the investigation of mechanisms for development is required, eg. Privatisation, Concessions, etc. **3.** The impact of pollution on the river systems is of particular significance to users of rivers and dams for recreational purposes and requires regular monitoring. (see section A.8)

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** DWAF needs to encourage developments around existing dams for recreational use by making these sites available to the tourism and leisure industry. DWAF is responsible for rezoning of these sites and Provincial Administration to assume management control.	Regional Office (On-going)
References:	1. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302	

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A.7.3 PUBLIC HEALTH & SAFETY STRATEGY

Management objective:	The water resource needs to be protected, and it must be ensured that users in the Vaal River Catchment area are safe from the effects of poor water quality that can create health problems (e.g. cholera), and it must be ensured that strategies are in place to deal with floods and droughts as these impact on the socio-economic environment.
Situation Assessment:	In the Middle Vaal area, the primary concern regarding public health and safety relates to the quality of water in the Vaal River. It is considered that swimming in the Vaal River can be dangerous to public health and measures need to be put in place to protect people, eg. Adequate bio-monitoring is required in the Vaal River to provide water quality data that could be used in issuing of warnings to potential swimmers. The illegal disposal of medical waste is considered to be a problem. The Department's current commitments are associated with: • Managing floods and drought disasters by direct intervention on the ground. • Reducing pollution and preventing serious or hazardous pollution events and promoting dam safety. • DWAFs (and the CMAs in some cases) future commitments under National Disaster Management Act which is to be promulgated in 2003 will be: • DWAF/CMA will be required to become involved in supporting and enforcing disaster management planning by all relevant authorities. • Drafting a National Flood Management Policy (DWAF). • Dam safety policy (DWAF). • Co-operating with the Department of Agriculture on drought relief strategies and policy formulation. • Pollution of water resources (ie limiting health hazards such as cholera). • Cooperation with others toward development of a warning system for water quality *The following requirements have been identified for this catchment with regard to public health and safety:* **1.** There is a lack of emergency preparedness plans for flooding of dams. **2.** There is need for comprehensive operation and maintenance manuals for all dams in the catchment. 2. Water quality needs to be maintained at a safe level for aquatic ecosystems, as well as for human recreational and consumptive needs

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** Apply the existing roles and delegated responsibilities regarding flood management control and disaster management rules. For the main stem of the Vaal River, this is dealt with as a national issue and for the tributaries and smaller dams, it must be dealt with at a regional level. The issues related to flood management are dealt with in the Vaal Overarching ISP.	
	M2. Flood preparedness plans and O&M manuals are in the process of being updated. The contents of the updated manuals must be communicated and implemented.	Regional Office (Priority 1)
References:	1. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302	

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A.8 MONITORING AND INFORMATION MANAGEMENT STRATEGY

Management objective:	The design and implementation of effective monitoring networks and repository databases to ensure adequate quantification of the balance between sustainable water use and protection for surface freshwater bodies and groundwater.
Situation Assessment:	**Water use control** Irrigation is by far the main water user in this WMA and almost no data is available on the actual water use by and return flow from irrigation, as irrigation abstractions are not gauged. As the irrigation sector is the largest water user in many sub-catchments, and at the same time has the poorest available data regarding water use and return flows, it is recommended that projects should be initiated to obtain better information regarding irrigated areas and the monthly irrigation water usage as well as irrigation return flows. **Monitoring networks and data capturing.** Resources currently available for monitoring are generally inadequate throughout all existing systems. Some notable issues in the ISP-area are briefly discussed below: ▪ Although groundwater potential and use is significant in this WMA, groundwater monitoring is inadequate in terms of ambient water levels in aquifers used by municipalities. ▪ Biomonitoring and monitoring of fish indices are undertaken throughout the Middle Vaal WMA, specifically in the Sand/ Vet, Vals, Elandspruit, Skoonspruit, Vaal, Vet and Rhenosterspruit. ▪ Inadequate monitoring of water quality throughout the catchment. Adhoc monitoring generally occurs downstream of sewage treatment plants. ▪ Compliance monitoring by the Department of Mineral and Energy Affairs and the mines ▪ Bacteriological monitoring occurs in the KOSH area ▪ Rainfall and Streamflow monitoring occurs to some extent throughout the WMA ▪ Monitoring of irrigation use is inadequate, e.g. Abstraction from the Vaal River is not measured accurately. **Information Management** Information Management in the Lower Vaal is problematic due to the difficulties experienced with the existing information management systems, viz. WMS and NGDB (National Geohydrological Database). Water use control is an issue on the whole of the Vaal and can be managed better if more information is available and if more attention is given to data capture and storage. It is important to continue monitoring, specifically regarding water quality. This issue has to be dealt with at a regional level and needs to be in accordance with National policy. A study defining the data requirements to support the system analysis model was undertaken as part of the Vaal River System Analysis Update Study. The main recommendations from the study report with the title "*Data Inventory: Vaal Water Supply System Area"* should form the point of departure for the identification of all

Situation Assessment (continued):	monitoring needs. *The following gaps in the knowledge base have been identified:* **1.** Limited, almost no measured data available with regards to irrigation water use outside the government schemes. **2**. Rainfall monitoring to calculate recharge of groundwater in the focus areas are required, viz. Schoonspruit and KOSH areas. **3.** Streamflow monitoring is inadequate. The measurement of flow entering the Middle Vaal Catchment from the Upper Vaal is required, only if the blending option stops. **4.** Groundwater monitoring is inadequate in aquifers used by municipalities and agriculture, in terms of yield, quality, contamination, etc. Only the Schoonspruit, KOSH and Wesselbron areas are adequately covered. **5.** Reliability of quaternary-based irrigation data. A need exists to determine crop distribution and type on a quaternary catchment scale. This should be provided by the verification process. **6.** Inadequate information exists on Blackfly and other invertebrates, Algae blooms outside the Middle Vaal, and fish data. An extension of bio-monitoring is required to address this gap. **7.** There is a need to develop an integrated monitoring and information management plan. The plan must assess requirements, priorities, costs and provide motivation for funding. **8.** Additional flow gauges in the lower reaches of the Vals (at Bothaville) and Sand-Vet Rivers would make the hydrological model run more accurately in this catchment. **9.** A fuller record of water quality is required for Bloemhof Dam. Quality and flow from the new weir at Bloudrift Bridge in the Sand River would be useful. Water quality monitoring at C4H004, below the confluence of the Sand and Vet rivers is also required. **10**. Existing monitoring stations that were constructed for the hydrological model, and later vandalized, need to be repaired and re-commissioned. **11**. Streamflow measurement is required in the Lower Vet before water enters Bloemhof Dam. **12**. Koekemoerspruit weir needs to be upgraded. **13.** Vierfontein mine needs a weir (to be constructed at their cost) to measure the decant from the mine. *The following issues pertaining to monitoring and evaluation also need to be addressed:* **1.** Details of the various data related problems and shortcomings are given in the recommendations of the relevant study reports and should be consulted to evaluate and prioritise the monitoring needs. **2.** The National Water Act requires the Minister to establish national monitoring systems for water resources to collect appropriate data and information necessary to assess: • The quantity, quality and use of water in water resources. • The rehabilitation of water resources. • Compliance with resource quality objectives. • The health of aquatic ecosystems. • Atmospheric conditions, which may influence water resources. • Other data and information, which may be necessary.

	3. Clear direction is required from National DWAF regarding the monitoring, capture and storage of information. Roles and responsibilities of the National and Regional offices need to be clearly outlined.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1.** As part of the Over Arching ISPs a need was identified to undertake an assessment of all the monitoring needs to support Integrated Water Resource Management in the Vaal and Orange river catchments. The most important needs are given in the situation assessment of this strategy. Details of the monitoring needs must be obtained from the recommendations given in the relevant study reports. Responsibility for all monitoring requirements must be co-ordinated at WMA level.	National / Regional (Priority 1)
	M2. Develop a strategy and action plan to monitor irrigation water use.	Regional Office (Priority 1)
	M3. Flow gauging facilities have been recommended, in previous reports, at specific abstraction points as well as effluent discharge points in order to provide adequate data for calibrating and verifying the water quality models.	Regional Office (Priority 1)
	M4. An extension of the biomonitoring programme is required to all sub-catchments in the Middle Vaal, as well as to cover all relevant biomonitoring requirements, eg. Blackfly and other invertebrates, algae blooms, fish, etc.	Regional (Priority 1)
	M5. The following gaps need to be addressed: • Existing monitoring stations that were constructed for the hydrological model, and later vandalized, need to be repaired and re-commissioned. • Streamflow measurement is required in the Lower Vet before water enters Bloemhof Dam. • Koekemoerspruit weir needs to be upgraded. • Vierfontein mine needs a weir (to be constructed at their cost) to measure the decant from the mine.	Regional Office (Priority 1)
References:	1. Middle Vaal Water Management Area: Overview of Water Resources Availability and Utilisation, DWAF Report No. P WMA 09/000/00/0203 2. Water Resources Situation Assessment : Middle Vaal Water Management Area, DWAF Report No. P WMA 08/000/00/0302 3. Vaal River System Analysis Update : Integrated Vaal River System Analysis**:** DWAF Report No. P C000/00/18496	

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A.9 ISP IMPLEMENTATION MAIN STRATEGY

Management objective:	The above-mentioned strategies and approaches need to be implemented in future depending on priority. The work needs to be carried out by the designated responsible party, either the Regional Office or National Directorate. The activities in the ISP should be included in the annual budget cycles of the relevant directorates. Detailed scheduling of activities should be undertaken through the normal business planning human resource scheduling of DWAF. To gradually phase in a thorough public involvement process in parallel with the establishment of the Catchment Management Agency and the drafting of the Catchment Management Strategy. It should be communicated to the public and stakeholders that the ISP is DWAF's initial input to the formulation of the Catchment Management Strategy.
Situation Assessment:	The current Internal Strategic Perspective, as its name implies, has been intended to achieve a common water resources management approach within the Department and the intention is that the document will be made available to stakeholders once the first version is completed. Interaction has been limited to stakeholder awareness regarding this ISP development process. It is envisaged that the finally accepted Lower Vaal WMA ISP will be circulated to water user associations, forums and other pertinent stakeholder groups to inform them of the way in which DWAF wants to manage the water resources of the catchment. Stakeholder comment will then be requested. This effort may need community education with a view to empowering these stakeholders to fully understand the Department of Water Affairs and Forestry's perspective and in so doing to be capacitated to yield constructive comment. The ISP is intended to provide DWAF's input to the development of the Catchment Management Strategy, which will involve a thorough public participation process. This process could commence within a year or three (to be debated at the workshop) after the Lower Vaal WMA ISP depending on the approval of the Catchment Management Agency establishment proposals by the Minister.

MANAGEMENT ACTIONS		
Required actions, responsibilities and priorities:	**M1**. List of strategies that need to be tackled along with the bigger picture and assign responsible persons. These officials may need to employ others depending on the scale of the assignment.	Regional Office (Priority 1)
	M2. Design a public involvement/participation process (using current forum structures) that will eventually lead up to the formulation of a Catchment Management Strategy.	Regional Office (Priority 1)

	M3. Submit proposal to DWAF National for approval.	Regional Office (Priority 1)
	M4. Communicate to Catchment Management Forums, Bulk Users, Provincial Liaison Committees, Municipal Managers, etc. Initially circulate the finalised Lower Vaal WMA ISP to water user associations, forums and other pertinent stakeholder groups to inform them of the way in which DWAF wants to manage the water resources of the catchment. Stakeholder comment will then be requested.	Regional Office (Priority 1)
	M5. To get feedback from stakeholders in terms of reviewing the ISP. Incorporate comments and revise accordingly	Regional Office (Priority 1)
	M6. Preparation of presentation material for strategic decision-makers, as well as operational managers. Develop toolkit for presentation of ISP's to the various stakeholders and roleplayers.	Regional Office (Priority 1)
	M7. Undertake presentation "roadshow".	Regional Office (Priority 1)

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