water affairs

Department:
Water Affairs
**REPUBLIC OF SOUTH AFRICA**

# *Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)*

# REPORT ON MATTERS RAISED BY THE AGRICULTURAL SECTOR

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# Mokolo-Crocodile (West) Water Augmentation Project (MCWAP)

## REPORT ON MATTERS RAISED BY THE AGRICULTURAL SECTOR

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# Mokolo-Crocodile (West) Water Augmentation Project (MCWAP)

## REPORT ON MATTERS RAISED BY THE AGRICULTURAL SECTOR

### 1. PURPOSE OF THIS REPORT

The purpose of this report is to provide a brief description of the water resources situation and planning processes followed by the Department of Water Affairs (DWA) whereby the proposed project to augment water supplies to the Lephalale area was derived at. The report need to be used as a basis for the exchange of information. The purpose of this report is further also to group and consolidate the array of questions, matters and concerns raised by the representatives of the agricultural sector, discuss it and to provide response to these matters. In most instances this report serves to briefly confirm the responses already provided at meeting(s) of the Agri-Forum and Crocodile and Mokolo working groups.

With the above objective in mind the report serve to exchange information regarding the planning processes already followed, the water resources available and the processes that will still follow.

### 2. OBJECTIVE OF THE MOKOLO-CROCODILE (WEST) WATER AUGMENTATION PROJECT (MCWAP)

The objective of the Mokolo-Crocodile (West) Water Augmentation Project (MCWAP) Feasibility Study is to investigate the options on how to augment the water supply to the Lephalale area for the strategic development of the Waterberg Coal Fields without impacting on the water entitlements of the existing water users.

### 3. INTRODUCTION

The Lepalale area is situated in a part of the country that can be considered as water scarce area where local water resources cannot sustain the potential development. The water supply environment and the general local economic environment in the Lephalale and Lower Crocodile River (West) areas were traditionally predominantly agriculture areas and the mining and industry sectors in the area used relative small volumes of water. The development of the Waterberg coal reserves in the Lephalale area will enhance the contribution of the fuel and energy industry and the related developments to the economy, but will need additional water for their operation.

Some stakeholders are concerned that the irrigation water use may be impacted upon by these industrial developments. The concerns mainly revolve around the perceptions that the new demands can only be met by infringing on the existing water

entitlements and that the co-existence of the new and existing water demands is only feasible if new storage is created.

# 4. BACKGROUND

## 4.1. Background to the Study Area

The Mokolo Dam on the Mokolo River supplies water to the existing users such as Lephalale town, downstream irrigation farmers, Matimba power station and Grootegeluk mine. The 1:200 year (99,5% level of assurance) yield of the dam with the current level of development upstream is 39 million $m^3$/annum and have some water available for allocation to new users but not adequate for the total requirement. The allocation to irrigation from the yield of the Dam is 10,4 million $m^3$/annum. This is supplied to irrigators applying an operating rule whereby the water allocation is either 16 million $m^3$/annum for a specific year (from 1 July) if the storage in the Dam exceeds 50% on 1 April of that year or Zero if the water level of the dam on 1 April of that year is less than 50%.

The Crocodile River (West) is an important economic area where 25% of the GDP of the country is generated. The larger part of the industrial Metropolis of Gauteng is situated north of the Witwatersrand Ridge in the Crocodile River catchment and houses about 5,5 million people. The source of water supply to those users is mainly the Vaal River with the return flows then becoming available in the Crocodile Catchment as a source of water for further use. The Crocodile River (West) needs to be considered in different river reaches and sub-catchments. The Hartebeespoort Dam serves primary water users and water to approximately 15 000 ha of irrigation at an annual allocation of 6 200 $m^3$/ha. The area downstream of Roodekopjes and Klipvoor Dams is not supported from dams upstream of these and serve about 14 500 ha of irrigation managed by the Crocodile River (West) Irrigation Board. The quota has been revised to 8 000 $m^3$/ha on the basis that it is only fully allocated when the water is available. The irrigation water supply in this area is thus at a higher risk. Irrigation users in the Crocodile River reach downstream of the Crocodile (West) Irrigation Board area (Makoppa area) uses surplus water when available and do not have an entitlement to water made available from the upstream storage dams. They do however have the advantage of natural storage in the sandy alluvium aquifer that provides the bridging storage that can be used during periods of no or very little surface flow.

The Upper reaches i.e. mainly the catchments of Hartebeespoort and Roodeplaat Dams receive substantial volumes of water as return flows from the urban areas in parts of Gauteng which is supplied with water primarily through the Rand Water supply system. This is considered as a separate and growing source of water due to the rapid urban growth. In the year 2005 this return flows was already more than 300 million $m^3$/annum and is expected to grow substantially in the future, whilst the yield available in the system from natural surface water flows was 155 million $m^3$/annum.

## 4.2. Background to the Water Resources Planning and Strategies for the Study Area

The Department of Water Affairs (DWA), as the custodian of the water resources in the country, is leading the water sector on Water Resources Planning and Management. Besides other high level assessments this takes place in the form of Regional reconciliation studies. The basis for these Regional studies is captured in the National Water Resource Strategy, released in 2004 and which describes how water resources are protected, used, managed and conserved. This document is a public document that was widely communicated. These studies take a long term view on water related matters taking note of inter alia the Government's long term growth targets.

Water resource planning is a continuous process aimed at balancing water supply and demand. DWA is conducting a number of studies of the large Metropolitan areas of which the ***Crocodile (West) River Reconciliation Strategy*** and the ***Large Bulk Water Supply Reconciliation Strategy for the Vaal River System*** studies have relevance to the area under discussion. The Executive Summaries of these studies are included in **Annexure A1 and A2** respectively. These are comprehensive planning studies with the objective to determine a strategy that will ensure that sufficient water of adequate quality will be available when it is required in the future. Scenarios of future demands are developed and measures that would have to be implemented to meet those future needs are identified and investigated. In this regard it was already envisaged in 2004 that the transfer of water to the Mokolo Catchment will be required. Scenarios of future water requirements of the strategic industries in the Lephalale Area as well as the water requirements of current users have been considered. This indicates that water resource augmentation will most probably be required from The Vaal River to the Crocodile River (West) in order to enable the utilisation of the potential of the Waterberg Coal fields and this is demonstrated in the map of the Integrated Vaal River System in **Annexure A2**. The impact of such a transfer has been considered in the Vaal River Reconciliation Study.

## 4.3. Background to the Project

The plans to develop the rich coal reserves in the Waterberg coal field situated to the north and west of Lephalale is adding a further challenge and dimension to the Water Resource Planning and Management of the Crocodile River (West) Catchment. The Medupi power station is already under construction. Further developments include the possible development of further power stations by Eskom, the potential development of coal to liquid fuel facilities by Sasol and the associated growth in mining activities, other industrial development and residential development. Additional water in significant quantities will be required for these developments.

All these developments will take place in the water scarce area of the Mokolo (Mogol) River catchment, which is part of the Limpopo Water Management Area (WMA). The Mokolo Dam (formerly known as the Hans Strijdom Dam) is the largest of only a few dams in the Mokolo River catchment and supplies water to the existing Matimba Power Station, Grootegeluk Mine, Lephalale (Ellisras) Municipality and irrigation

downstream of the dam. The current water availability from the Dam allows only limited spare yield for additional allocation.

The development of new power stations and coal to liquid facilities are of high strategic importance with tight timeframes. The first generation unit of Medupi is scheduled to be operational by Jan 2012 and additional water needs to be available by mid 2011. The most viable options to satisfy these new demands is to augment existing water supplies by transferring surplus effluent return flows from the Crocodile River (West) / Marico WMA to Lephalale and the area around Steenbokpan, shown on the map attached attached as **Annexure B**.

To address the above mentioned needs, the DWA commissioned studies to investigate the Mokolo Crocodile (West) Water Augmentation Project (MCWAP). The Feasibility Study analyse the water demands and the various options of infrastructure required to provide in the demands, focussing on the optimum use of Mokolo Dam, the possible re-use of water, and transferring water from the Crocodile River (West). The study comprises different components such as a Technical Module, an Environmental and Public Participation and Socio-economic Module, etc. The total project will eventually comprise of different Phases defined as follows:

- Phase 1: Augment the existing supply to the Lephalale area from Mokolo Dam to provide in the growing water demands. The short term objective is to satisfy the new demands for the interim period until the transfer pipeline from the Crocodile River (West) can be implemented. The long term objective is to optimally utilise the full yield from Mokolo Dam.

- Phase 2: Transfer water from the Crocodile River (West) to the Lephalale area. Options to phase the capacity of the transfer pipeline (Phase 2A and 2B) must be investigated.

- Phase 3 is defined to be the conveyance of water between Roodekopjes Dam and the abstraction weir at Vlieepoort in the Crocodile River. Implementation of a River Management system is a key aspect of this phase. This also includes a possible future pipeline to limit water losses in the River.

- Phase 4 is also a future phase whereby the water in the Crocodile River (West) System will be augmented from the Vaal River Catchment when the local return flow resources in the Crocodile River (West) are inadequate.

The proposed solution to provide water to the new developments must take existing water entitlements into account.

## 5. ENGAGEMENT WITH THE AGRICULTURAL SECTOR

The water supply environment and the general local economic environment in the Lephalale and Lower Crocodile River (West) areas were traditionally predominantly agriculture areas and the Mining and Industry sectors in the area used relative small

volumes of water. The development of the coal reserves in the area will enhance the contribution of the industry to the economy but will need additional water for operation. Some stakeholders fear that the current irrigation water entitlements may be impacted upon by the industrial developments. The position of the Agricultural sector that has a very direct interest in the water infrastructure development is recognised and classified as an important stakeholder. Discussions have already taken place with the three main organizations in organised agriculture, namely Agri-SA, Transvaal Agricultural Union (TAU) and the National African Farmers Union (NAFU), as well as the two relevant Irrigation Boards (Crocodile-West and Mokolo). This engagement was expanded to also include land owners downstream of Vlieëpoort (Makoppa), Hartbeespoort Irrigation Board as well as those who might not be members of the mentioned institutions e.g. the hunters/game farmers and Eco-tourism.

It is important to obtain a consolidated view from the Agricultural Sector. Therefore an umbrella structure called the Agricultural Sector Forum (Agri-forum) with representation from all of the above, was established. The first meeting of the Forum was held on 27 January 2009. These discussions took place as a precursor to the more formal and structured Public Participation process, which forms part of the Environmental Module of the overall MCWAP Feasibility Study.

Two working Groups namely Mokolo and Crocodile (West) were also established to deal with matters related to these two directly affected groups. The membership consists mainly of members from the two above mentioned Irrigation Boards within the boundaries of the MCWAP study area. The Crocodile River Working group also includes representatives from the Makoppa area downstream of Vlieëpoort and from Hartebeespoort Irrigation Board. The Governance structure of the MCWAP Feasibility study is attached as **Annexure C.**

The specific concerns/requests/statements/issues raised by the agricultural sector and the appropriate replies are listed in **Anexure D**. The content of most of the concerns is however dealt with in the body of this report in the sections following below.

## 6. THE PLANNING PROCESS AND WATER REQUIREMENTS

Planning for the utilisation of water in terms of the where, when and by whom, is the responsibility of DWA. The planning stage in the life cycle of a project is an ongoing dynamic part of the process when the circumstances and options are dynamic and changes occur rapidly based on different forces in the economy and results of inputs to the studies. As such the information that is available may change frequently until a stable situation is reached. Involvement of stakeholders in the early stages of the project has the advantage that the inputs of the stakeholders can be incorporated in the planning process whilst the downside is that all the stakeholders need to appreciate the special dynamic and uncertain circumstances. When the project

moves into the design phase certain aspects need to be agreed with the main users such as the water use, tariffs, layout, take-off positions, capacity, etc.

Integration of planning over all the sectors and large users involved such as Eskom Generation, Eskom Transmission, Eskom Distribution, Sasol, roads, railways, Municipal services, etc is always an ideal that needs to be strived for. The practical situation in the Lephalale area is that the development is so rapid and exposed to international market and financial forces that require flexibility. Different large users and even sectors are at different points in their planning process, making it difficult to coordinate and integrate the processes. A list of the various studies applicable to the Crocodile and Mokolo catchments and directives on how to obtain them, is given in **Annexure D.**

## 7. POSSIBLE WATER RESOURCES TO MEET THE DEMANDS

Different sources of water for this development were considered, but only a limited number are viable options. The general approach is that water will be supplied to new users without affecting the legal entitlements of existing users.

### 7.1 Ground Water

Drilling around the Lephalale area was undertaken by the DWA's Geo-hydrological Division as part of a Water Research Commission (WRC) research project. The aim is to establish the extent and potential of deep groundwater resources in this area. The drilling took place through the primary aquiver, where most of the local boreholes are situated, into the deep secondary aquiver. At this stage it is for exploratory purposes and if it shows potential, production boreholes might be developed, with close monitoring of a possible impact on the primary shallow aqcuifer, although such an impact is regarded as unlikely.

This will however be only for primary use or during construction stage of new developments. The expected extent of this source is not even remotely within the range of the required industrial demands.

### 7.2 Re-use of Effluent in the Project Area

The very high cost of the imported water will be a great incentive for the new water users to re-use water as far as possible. This as well as recycling of the treated effluent from the municipal waste water works to industries has been taken into account in the determination of the water demand quantities. Relative to the total demand, it is not a very significant quantity, but may not be ignored. This will also mean that the principle of zero effluent will be applied to large users so that the risk of pollution of local streams is limited.

### 7.3 Mokolo Dam

The potential to obtain additional water from this dam on a sustainable basis is limited. Due to the very challenging timeframes within which the first additional quantities of water must be provided, it might be necessary to operate the dam above

it's assured yield for a short period to supply this water as an interim measure from Mokolo Dam, until such time that the transfer scheme from the Crocodile becomes operational. Irrigation water rights may have to be obtained on a temporary basis as a contingency measure in which case compensation would be payable.

## 7.4 Crocodile Water

Based on current knowledge, it is not envisaged at this stage that irrigation water entitlements on the Crocodile River (West) will need to be obtained, even though the current legislation does make provision for the purchasing of such water entitlements.

## 7.5 Return Flows in Crocodile River (West) and Vaal River Catchments

The water resources considered for the new development is to be mainly the growing volume of return flows originating from urban developments in the Gauteng and surrounding areas. This will be the first major source of water. Once the demand exceeds the available source in the Crocodile River (West), it will be augmented from the surplus available effluent emanating from sewage plants to the south of Johannesburg which will be transferred from the Vaal River catchment to the Crocodile River (West) to supplement these supplies.

## 7.6 Creating More Storage by Raising of Existing Dams and/or Building new Dams

The Klipvoor and Vaalkop Dams were completed in the 1970's, Mokolo Dam was completed in 1980. The raising of Dams such as the Klipvoor Dam and Mokolo Dam, as well as the construction of additional dams on the Crocodile River system remains an option to be considered in the future for further water resources development . The creation of storage poses the following challenges:

- It does not provide adequate yield.
- It is costly and not viable in current circumstances
- It also has the further challenge in that the Crocodile and Mokolo catchments are part of the international river basin shared with three other countries. Agreement will have to be secured in terms of the Revised SADC Protocol on Shared Water Courses that will take a significant period of time to obtain.
- In the Crocodile River System with a high percentage of return flows passing through, the ability of the Dam to store high flows (floods) for later use is diminished and make it less effective.
- Filling times required.

These items were extensively discussed during the Crocodile Working Group Meeting and the Agri-forum meeting.

The available storage in the Crocodile River (West) are not being used optimally at this stage due to the steady stream of return flows that has kept Hartebeespoort Dam spilling most of the time during the past decade and a half. This storage capacity will be better utilised once water the transfer of water to the Lephalale area commences.

The raising of dams and the creation of additional storage on rivers are always options that DWA considers in their water resource planning activities and will be investigated further for the longer term water resource development as explained in the sections above. In this regard the Crocodile (West) Reconciliation Strategy propose the investigation of a possible balancing dam to reregulate the return flows but due to factors mentioned above the project team opted for a River Management system as discussed in Section 8.2 as the preferred option to be implemented at this stage.

# 8. OTHER IMPORTANT WATER RESOURCE MANAGEMENT MATTERS

## 8.1 Reserve determination

The determination of the reserve on both the Crocodile River (west) and Mokolo Rivers are currently in progress in a separate process. The decisions regarding the implementation of these will not be directly associated with the implementation of the MCWAP. However, the objective of the MCWAP is not to infringe on current water use entitlements including the entitlements and rights of the environment. When The Reserve is finally approved the DWA will need to apply all measures required to implement the Reserve.

## 8.2 River Management

As part of the new development the current system of river management and abstraction control will need to be upgraded. The river management and operating rules that has been applied over many years in other catchments such as the Vaal system and the Crocodile River (East) and Komati River system will need to be evaluated and components of it applied to a system for the Crocodile River. This will also be to the benefit of the existing users. The operating rules and river management system will need to be developed and implemented with the active participation and leadership of the Irrigation Board and Agri-Forum.

## 8.3 Risk Levels for Agriculture

It is common practice not only in South Africa but world wide to have different assurances of supply for different water user sectors. For various reasons it has been the practice within DWA to classify the Agricultural Sector (irrigation) broadly within the bracket of approximately 70% assurance of supply. This is the existing practice in other parts of the country. In future when this will be applied in the Crocodile River (West) it will be experienced that in times of drought the irrigation will be under different restrictions than the other sectors. Curtailment rules will be developed as part of the River Management system in collaboration with the Irrigation Board and Agri-Forum.

It is also possible that current development might have taken place beyond the boundary of a legal entitlement and that will be dealt with by the DWA and the Irrigation Board.

## 8.4 Current Position of Irrigators

As the custodian of the country's water resources, the DWA is in the process to perform the Validation and Verification functions in both the Mokolo and Crocodile River Catchments. The sudden increase in the water demands created by the new developments, did in fact raise the priority for abstraction monitoring and control for these two catchments significantly. This is an aspect where the intimate involvement and co-operation by the different water sectors, DWA and the irrigation board is of crucial importance to ensure the successful management of the water resources.

Regarding the Makoppa area where the users are dependent on the surplus flows from the tributaries and spills from upstream areas, the design of the Vlieëpoort weir will need to have the minimum storage capacity to allow the flows from the tributaries to pass through. The pumping capacity also need to be flexible enough to allow for some variation in order to pump the flow that reaches the weir from the upstream dams. That will limit the need for additional balancing storage in the river.

# 9. WAY FORWARD

More interaction with the Agricultural sector should take place through the Working Groups. The following matters should be addressed:

## 9.1 Socio –economic study

The appointment of a service provider to perform this independent study as part of the EIA specialist studies is well under way. This is a matter that would require cooperation and participation from the Agri-forum and working groups.

## 9.2 Mokolo Work Group:

The investigations regarding the need for and the basis of possible acquiring of the water entitlements of the Mokolo irrigation is programmed to proceed as a next stage.

## 9.3 Crocodile Working Group:

The discussions with the working regarding the different options in Operating rules and River Management and Monitoring need to proceed in the near future. Some members already attended a site visit to other areas where such systems are in place. There are a number of rivers where systems are functional and the best use of current knowledge can be made. The roles of the Irrigation boards are not only important as participants but should be seen as active leaders in the field of optimal water utilisation.

## 10. CONCLUSION

The above is a compilation of matters that have come to the fore during a number of engagements with the Agricultural Sector. It is clear that the irrigation sector have a large number of issues and concerns, a comprehensive list of the issues of the irrigation sector is captured. The fact that the Department intends to utilise return flows which is generated mainly by water originating from the Vaal River system in order to supply water to the new uses in Lephalale, without affecting the entitlements of existing users should provide comfort. The details of most of these matters will be dealt with in the EIA process. However, some will be dealt with through other parallel processes. In this regard the creation of additional storage is of significance. DWA took note of the view of the irrigation sector and it will be considered in the normal future planning processes of the Department as explained before.

Another matter that is of extreme importance is the future need to manage the water resources in this area with much greater intensity and care. In this regard the continued and active involvement of the Irrigation Boards in their statuary roles and their obligation of leadership and as agents of change in the total process, also came clearly to the fore.

**Mr LS Mabuda**

**CHIEF DIRECTOR: INTEGRATED WATER RESOURCE PLANNING (ACTING)**

**DATE**:

# ANNEXURE A

# ANNEXURE A1

## Crocodile (West) Reconciliation Strategy: Executive Summary

# ANNEXURE A2

## Large Bulk Water Supply Reconciliation Strategy for the Vaal River System: Executive Summary

## ANNEXURE B

## MCWAP Layout Map

# ANNEXURE C

## Governance Structure of the MCWAP Feasibility Study

## ANNEXURE D

## Issues / Concerns / Statements from Stakeholders from Agriculture and the responses thereto