APPENDIX E

DISCUSSION DOCUMENT ON

THE INSTITUTIONAL REQUIREMENTS AND OPTIONS FOR THE MANAGEMENT OF MCWAP

MOKOLO AND CROCODILE (WEST) WATER AUGMENTATION PROJECT (MCWAP) FEASIBILITY STUDY

REPORT 10: REQUIREMENTS FOR THE SUSTAINABLE DELIVERY OF WATER

Project No. WP9528

APPENDIX E: DISCUSSION DOCUMENT ON THE INSTITUTIONAL REQUIREMENTS AND OPTIONS FOR THE MANAGEMENT OF MCWAP

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1.1. Background

The Mokolo and Crocodile River (West) Water Augmentation Project (MCWAP) will supply the planned coal mines, coal fired power stations and coal to petroleum plants as well as associated users with raw water. The proposed developments will take place along a roughly east-west corridor between Lephalale and Steenbokpan and will utilise the underlying coal field. In order to support this development water will be supplied directly from the Mokolo Dam on the Mokolo River and from the Crocodile River (West) after being received from the Klipvoor, Roodekopjes and Vaalkop Dams. The water will be pumped from Mokolo Dam and from an abstraction site on the Crocodile River to Terminal Reservoirs located on the properties of each of the main users.

Presently the main parties to the MCWAP are the owner, DWA, and TCTA as their Implementing Agent, and the main users, being Eskom, Exxaro, Sasol and the Municipality of Lephalale. Other interested and affected parties are the existing users supplied from the Mokolo Dam and the existing users supplied from the Crocodile River (West) downstream of the Vaalkop, Roodekopjes and Klipvoor dams. These users rely on releases from these dams and accruals from the catchments downstream of the dams.

The MCWAP location plan and a diagrammatic layout of the scheme are shown in Figure 1-1 and Figure 1-2, respectively.

1.2. Management Philosophy

Water resources are a scarce commodity in the area of influence of the MCWAP and the planned industrial developments will mostly be classified as strategic from a national perspective. This means that very high levels of assurance of water supply (99.5% or better) must be maintained at all times for the industrial users of the MCWAP. Use of all water resources will therefore have to be carefully planned, managed and monitored. Droughts, floods events and climatic (temperature, wind, cloud cover, humidity, etc.) conditions and will also impact heavily on water usage and execution plans will consequently require re-evaluation and modification at intervals and even sometimes at very short notice. The preferred MCWAP layout with the water abstraction works at Vlieëpoort is effectively at the end of about 130 km long section of river (Crocodile River (West) with a large number of users between the water source (Klipvoor, Roodekopjes and Vaalkop Dams) and the water abstraction facility at Vlieëpoort. The alternative MCWAP layout with the abstraction works at Boschkop would have had the same river management complexities, be it on a smaller scale, but the cost of the additional 60km of pipeline that would be required by far outweighed the incremental cost associated with the management of the river to Vlieëpoort.

Estimates of the existing irrigation and MCWAP water requirements (Scenario 9) are summarised in Table 1-1 below.

Table 1-1: Irrigation Requirements along the Crocodile River (West)

Water Sources	**Volume Required (Million m^3 per annum)**
Klipvoor Dam	56
Roodekopjes Dam	33
Vaalkop Dam	3
Boreholes in the Alluviums	28
TOTAL	**120**
Reported Water Usage	**Volume Required (Million m^3 per annum)**
Upstream of Boschkop (approximately 20 %)	24
Upstream of Vlieëpoort (approximately 80 %)	97
MCWAP Water Requirements	**Volume Required (Million m^3 per annum)**
Phase 1 (Mokolo Dam)	28,7
Phase 2 Stage 1 (Crocodile River (West)	169,3

In addition, the new infrastructure required for the management of the river (see other sections of this report) and the infrastructure required to deliver water to the users in the Lephalale and Steenbokpan area needs to be well operated and maintained.

The operation of a scheme of this strategic nature will require strong management, liaison and leadership skills as well as a competent support team to plan dam releases, manage and monitor water usage and to operate and maintain the infrastructure. Because of the unpredictable nature of such an operation a dedicated team located within the management area should be provided.

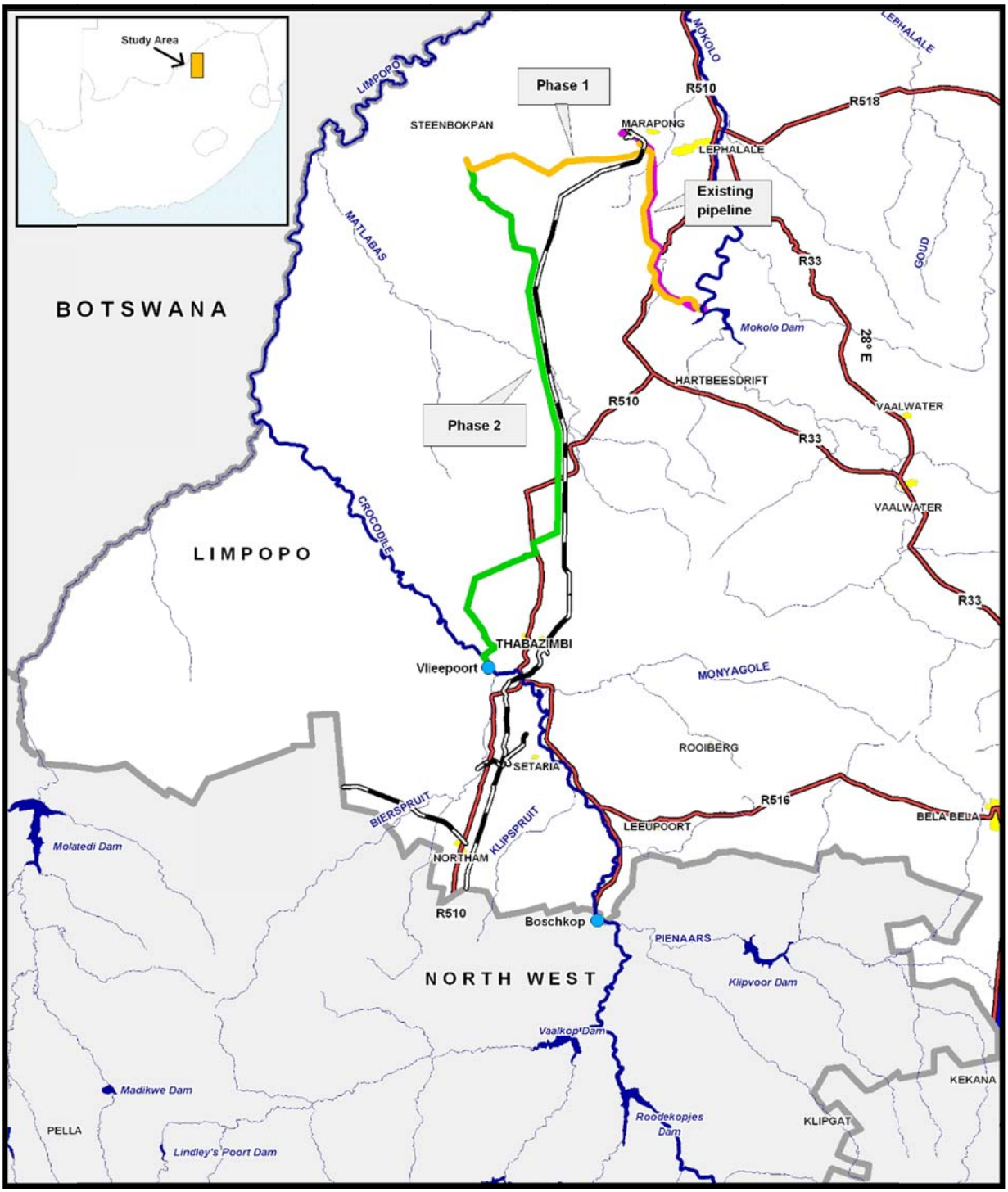

Figure 1-1: MCWAP Location and Overall Layout Plan

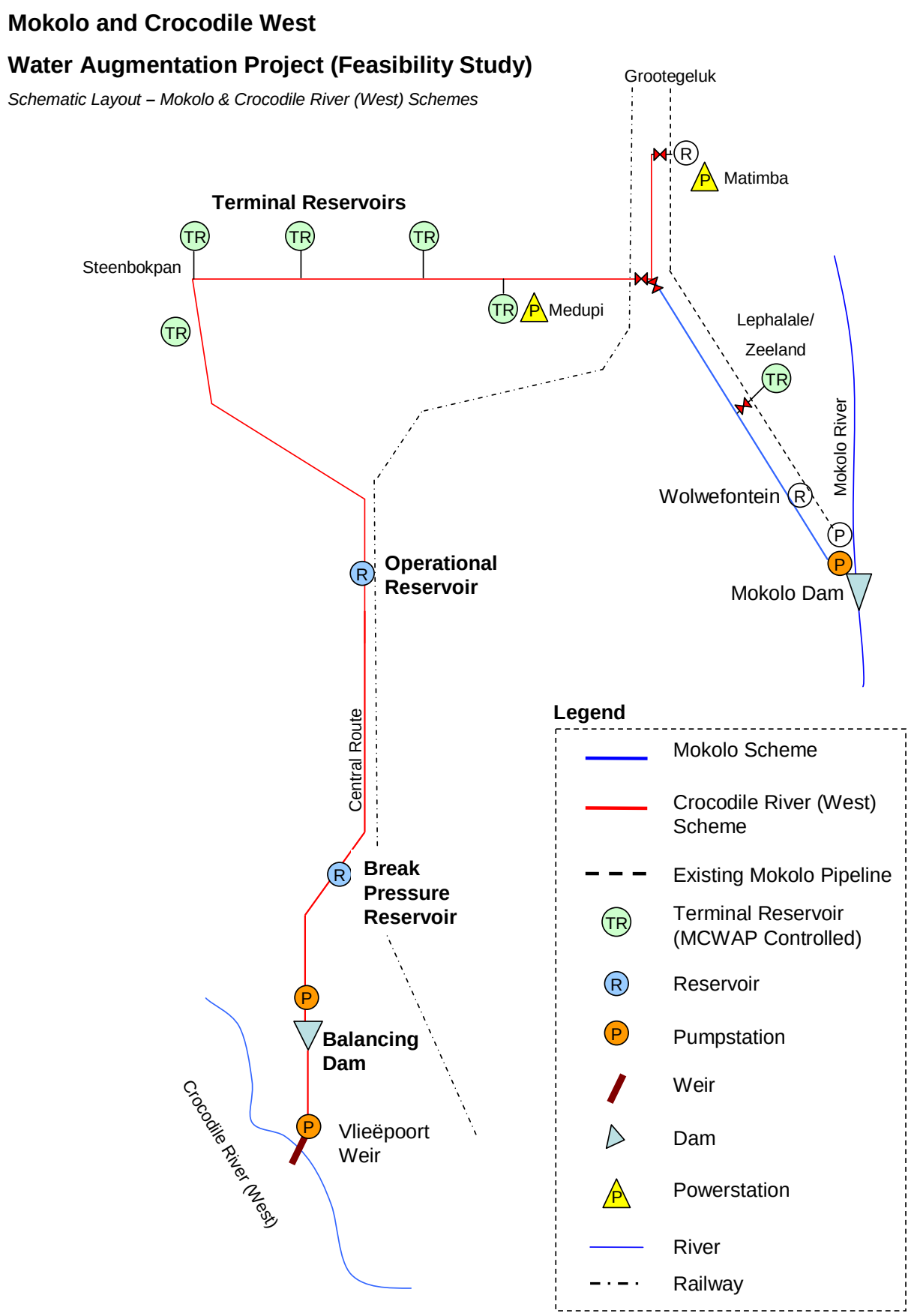

Figure 1-2: Diagrammatic Layout of MCWAP Scheme

1.3. Institutional Management

Institutional management is considered to be made up of the following components:

- Source Management;
- River Management, and
- MCWAP Scheme Management Authority.

For the purpose of this document, the authority for the River Management will be called a River Management Authority (RMA) and may apply to both the Mokolo and Crocodile (West) Rivers. For the management of the MCWAP, reference will be made to the Scheme Management Authority (SMA). In the case that an overarching authority supervising the RMA and SMA, reference will be made to the MCWAP Authority.

1.3.1. Source and River Management

Brief discussions were held with current and ex-DWA employees that have extensive experience in the field of institutional management and have until recently provided training to DWA personnel on the legal and practical requirements of the Water Act with respect to the establishment of Water User Associations (WUA). Discussions were also held with staff of the Gauteng Regional office who's responsibility it is to manage, operate and maintain the VRESAP and other similar projects in the Gauteng region. It appears that:

- DWA is in the process of establishing WUAs to manage and operate (if required) water abstractions/releases from state dams and rivers. This seems to be the preferred way, in terms of the Act, to manage water resource releases.
- The DWA is, however, encountering serious delays in establishing some of the WUAs and is thus forced to manage, operate and maintain the water release systems together with the projects/schemes themselves.

It thus seems that in normal situations for which WUAs were intended in terms of the National Water Act, water releases could be managed and operated by either:

- Water Users Associations,
- DWA, or
- Any other body nominated by DWA.

The disadvantages from a technical perspective in this case of using the WUAs to manage and operate water releases are that:

- WUAs may not have been established on the Mokolo and Crocodile (West) rivers by the time the MCWAP is commissioned;
- WUAs are unlikely to have the technical skills base (that would be more appropriate in a specially constituted water supply authority such as KOBWA) to determine water availability from the upstream dams, to determine dam releases, manage the river flows properly, curtailments of supplies during droughts, scheduling and controlling the abstractions by the users, etc. such as are necessary for the strategic MCWAP;

- Because of shortcomings in their skills base avoid or fail to plan correctly and for the appropriate expenditure necessary to perform the functions required; and
- The interests that could influence the kind of decisions that are required to manage the river flows are beyond those normally falling within the ambit of a WUA.

It is therefore recommended that the functions and responsibilities of the WUAs in respect of the MCWAP be limited to representation of their members' interests, co-ordination of water requirements, regulation and monitoring of water use of the members of the WUA. These could effectively be contained in a River Management Authority (RMA) that could be specifically established for the two sources for the purposes of MCWAP.

1.3.2. MCWAP Scheme Management

As far as the management of water supply schemes or projects themselves are concerned, these can be managed and operated by either:

- Water Authorities such as Water Boards or other utilities, or
- DWA.

Three management options were considered:

(i) Dedicated team provided by DWA (or TCTA),

(ii) DWA (or TCTA) contracting a team from the private sector to work under their auspices, or

(iii) A dedicated MCWAP Authority to be created along the lines of KOBWA and other similar authorities.

Option (i) is considered as problematic because of the current shortage of suitably qualified staff in DWA. All the proposed functions discussed below would nevertheless apply should this option be implemented.

Option (ii) was not considered further for this document. Delegation of executive powers to an outside company may be problematic from a legal and governance point of view. The option of DWA contracting the operations and maintenance to concessionaires is, however, an option that needs to be investigated further.

Option (iii) is recommended because the MCWAP Authority can be staffed from outside of DWA and all the necessary powers to deal with the day to day operation of the scheme can be delegated to the authority. Regular co-ordination meetings with DWA management and the user representatives (RMAs) would nevertheless be required. The main advantage of this option is that the necessary legal, funding and governance frameworks for the establishment of such an authority already exist in the form of, for example, Rand Water (and KOBWA).

A MCWAP Authority would be managed by a Board consisting of representatives of DWA, TCTA, the RMA(s) and the Scheme Management Authority. A Chief Executive Officer (CEO)

will be responsible for the implementation of the policies, functions and responsibilities of the Authority and will be an ex officio member of the Board. The CEO will also have a dedicated support team for this purpose. Further specific functional support will be provided by DWA Regional Offices/CMAs and the WUAs.

A MCWAP Authority would therefore be responsible for the planning and management of dam releases made upon directives given by DWA and RMAs, abstraction of water from the Crocodile River (West) and Mokolo Dam and delivery of untreated water to the consumers in the Lephalale - Steenbokpan area with due regard to the following:

- Environment;
- Security;
- Reliability of supply (specified as 99,5% for the strategic users);
- Managing the releases from Kilpvoor, Roodekopjes and Vaalkop Dams and water supplies in the Crocodile River (West) downstream of dams the in a transparent and accountable manner;
- Managing the releases from Mokolo Dam in a transparent and accountable manner, and
- Managing the water supplies to the users from the MCWAP in a transparent and accountable manner.

Three distinctly different functions must be performed by the MCWAP Authority. These are:

- Management of the river flows in the Crocodile River (West), which can be delegated to a body or authority specifically constituted for this purpose and named the Crocodile River (West) River Management Authority (CRW RMA) for the purposes of this report;
- Management of releases from the Mokolo Dam and flows in the Mokolo River, which can be delegated to a body or authority specifically constituted for this purpose and named), for example, the Mokolo River Management Authority (MR RMA) for the purposes of this report;
- Abstracting water from the Mokolo Dam and the Crocodile River (West) at Vlieëpoort and managing its supply and distribution to the users supplied by the MCWAP, which can be delegated to a body or authority specifically constituted for this purpose and in this case named the MCWAP Scheme Management Authority (MCWAP SMA), and
- Operating and maintaining the MCWAP (also the responsibility of the MCWAP SMA).

Note that the CRW RMA and MR RMA could be combined into one single authority responsible for both the Crocodile (West) and Mokolo River Management (e.g. the MCWAP RMA). Combination of the RMA and SMA is possible, but however not recommended as their functions and memberships would be too diverse to accommodate in a single authority

The broad structure therefore proposed for this MCWAP Authority, MCWAP SMA and the RMAs are shown on the Figure 2-1, Figure 2-2 and Figure 2-3 included below.

2. MCWAP AUTHORITY

In order to meet the obligations and responsibilities, an organisational design of a possible MCWAP Authority is put forward:

2.1. Purpose

The purpose of the proposed authority would be to plan and manage river flows along the river reaches downstream of the Klipvoor, Roodekopjes and Vaalkop Dams as far downstream as Vlieëpoort, the abstractions from the Mokolo Dam and the Crocodile River (West) for supply to the users from the MCWAP and to operate and maintain the MCWAP.

2.2. Project Components and Area of Control

The areas within the Crocodile River (West) and Mokolo River catchment areas where the MCWAP Authority will be responsible for all river flow and abstraction management as well as infrastructure operation and maintenance is proposed to be as follows:

Table 2-1: MCWAP Authority Area of Responsibility

Component Description	Responsibility	Interfaces
1) Kilpvoor Dam.	Request releases from dam operator (DWA).	(i) Pienaars River CMA for catchment above Klipvoor Dam. (ii) DWA Region.
2) Pienaars River to confluence with Crocodile River (West).	Monitor usage and losses.	River Management Authority (RMA) / Crocodile Irrigation Board.
3) Roodekopjes Dam.	Request releases from dam operator.	(i) Crocodile River CMA for catchment above Roodekopjes Dam. (ii) DWAF Operations at Hartebeespoort Dam. (iii) DWAF/Authority responsible for possible future Klip River transfer scheme. (iv) DWAF Region.
4) Crocodile River (West) to Boschkop or Vlieëpoort Abstraction Works.	Monitor usage and losses.	River Management Authority (RMA) and Crocodile Irrigation Board.
5) Vaalkop Dam.	Request releases from dam operator.	(i) Elands River CMA for catchment above Vaalkop Dam. (ii) Magalies Water Board. (iii) DWAF.
6) Elands River to confluence with Crocodile River (West).	Monitor usage and losses.	River Management Authority (RMA) / Crocodile Irrigation Board.
7) Boschkop Abstraction Works (may not be required).	Manage, operate and maintain weir, pump stations, desilting works and appurtenant works.	RMA/Crocodile Irrigation Board and Landowners.

Component Description	Responsibility	Interfaces
8) Vlieëpoort Abstraction Works.	Manage, operate and maintain weir, pump stations, desilting works and appurtenant works.	River Management Authority (RMA), but including: (i) Landowners. (ii) Mines. (iii) Thabazimbi Municipality. (iv) Other registered users.
9) Crocodile River (West).	Monitor usage and losses.	River Management Authority (RMA) / Crocodile Irrigation Board.
10) Mokolo Dam and River.	Request releases from dam operator and monitor usage and losses.	(i) River Management Authority (RMA) / Mokolo Irrigation Board. (ii) Mokolo CMA. (iii) DWA Region.
11) Pipelines from Abstraction Works on Crocodile River (West) and from Mokolo Dam to Client/User Terminal Reservoirs.	Maintain access on to servitudes, operate and maintain pipelines and monitor losses.	(i) Landowners. (ii) Owners of adjacent or crossing servitudes. (iii) Other registered land users.
12) Intermediate Balancing Reservoirs on pipelines and Client/User Terminal Reservoirs.	Operate and maintain reservoirs and intake/outlet works and monitor losses.	(i) Landowners. (ii) Other registered land users. (iii) Clients/users.

Releases from the Klipvoor, Roodekopjes and Vaalkop Dams are to be determined by DWA in consultation with inter alia the other Limpopo Watercourse States as provided for in the LIMCOM Agreement as may be required.

2.3. Institutional Arrangements

As further clarification of the proposed functional structure for the various MCWAP Management Authorities are shown in Figure 2-1, Figure 2-2 and Figure 2-3 below, the following.

2.3.1 MCWAP Authority

The function of the MCWAP Authority is to manage the water supplies and river flows of the Crocodile River (West) downstream of the Klipvoor, Roodekopjes and Vaalkop Dams as well as Mokolo Dam, and supply water to the users supplied by the MCWAP and to operate and maintain the MCWAP.

The Authority would be managed by the Management Board. The Chief Executive Officer will be responsible for the implementation of the policies, functions and responsibilities of the Authority and will report to the Board. The CEO will also have a dedicated support team for this purpose. Further functional support/liaison will be provided by DWA Regional Offices/CMAs and the River Management Authorities (RMA).

Refer to Figure 2-1 for further details.

2.3.2 MCWAP Authority Management Board

The Management Board will be a decision-making body for policy making within the framework determined by DWA from time to time and management matters affecting the Authority.

The Board would comprise representatives appointed by DWA and TCTA. The MCWAP SMA and the River Management Authorities (RMAs) will represent the interested and affected parties including the bulk users. The Board will appoint a CEO to lead and manage the Authority, and who will be an ex-officio member of the Board.

The Board members shall be persons whose qualifications and expertise enable them to contribute to the effective management of the water resources under its control and the effective operation and maintenance of the MCWAP.

2.3.3 MCWAP Scheme Management Authority (MCWAP SMA)

The function of the SMA is to operate and maintain the MCWAP. The main responsibilities of the SMA would be:

- Abstraction of water from the Mokolo Dam and the Crocodile River (West) at Vlieëpoort and managing its supply and distribution to the users supplied by the MCWAP, and
- Maintaining the infrastructure of the MCWAP.

The SMA will have a Management Board that will be responsible for policy making within the framework determined by DWA from time to time and management matters affecting the Authority. The Board would comprise representatives from DWA, TCTA and the different bulk water users (ESKOM, SASOL, etc.). The Board will appoint a CEO to lead and manage the Authority, and who will be an ex-officio member of the Board.

Refer to Figure 2-2 for further details.

2.3.4 River Management Authority (RMA)

Separate additional River Management Authorities should be formed for the Crocodile River (West) and Mokolo River users.

- The Crocodile River (West) River Management Authority (CRW RMA) would consist of the representatives of the Madibeng and Thabazimbi Local Municipalities, the Crocodile River Irrigation Board and the Lower Crocodile River Irrigation Board, Hartebeespoort Dam Irrigation Board, the MCWAP SMA and a member of DWA Regional Office/CMA. See Figure 2-1 and Figure 2-3for details.
- The Mokolo River River Management Authority (MR RMA) would consist of the representatives of the Lephalale Local Municipality, the Mokolo River Irrigation Board and the Mokolo River Upstream Irrigation Board, the MCWAP SMA and DWA Regional Office/CMA. See Figure 2-1 and Figure 2-3 for details.

The functions and responsibilities of the RMAs should be limited to representation of their members' interests, co-ordination of water requirements as well as monitoring, reporting and prevention of unauthorised water use. These RMAs will report to the MCWAP Authority with respect to water requirements and monitoring and also implement abstraction planning and demand management as directed by the MCWAP Authority. They will have input into the overall management and operation of the MCWAP Authority through the appointed representatives from their membership.

The RMA will have a Management Board that will be responsible for policy making within the framework determined by DWA from time to time and management matters affecting the Authority. The Board would comprise representatives from DWA, TCTA, and the MCWAP SMA and user representatives to represent the interested and affected parties. The Board will appoint a CEO to lead and manage the Authority, and who will be an ex-officio member of the Board.

Refer to Figure 2-3 for further details.

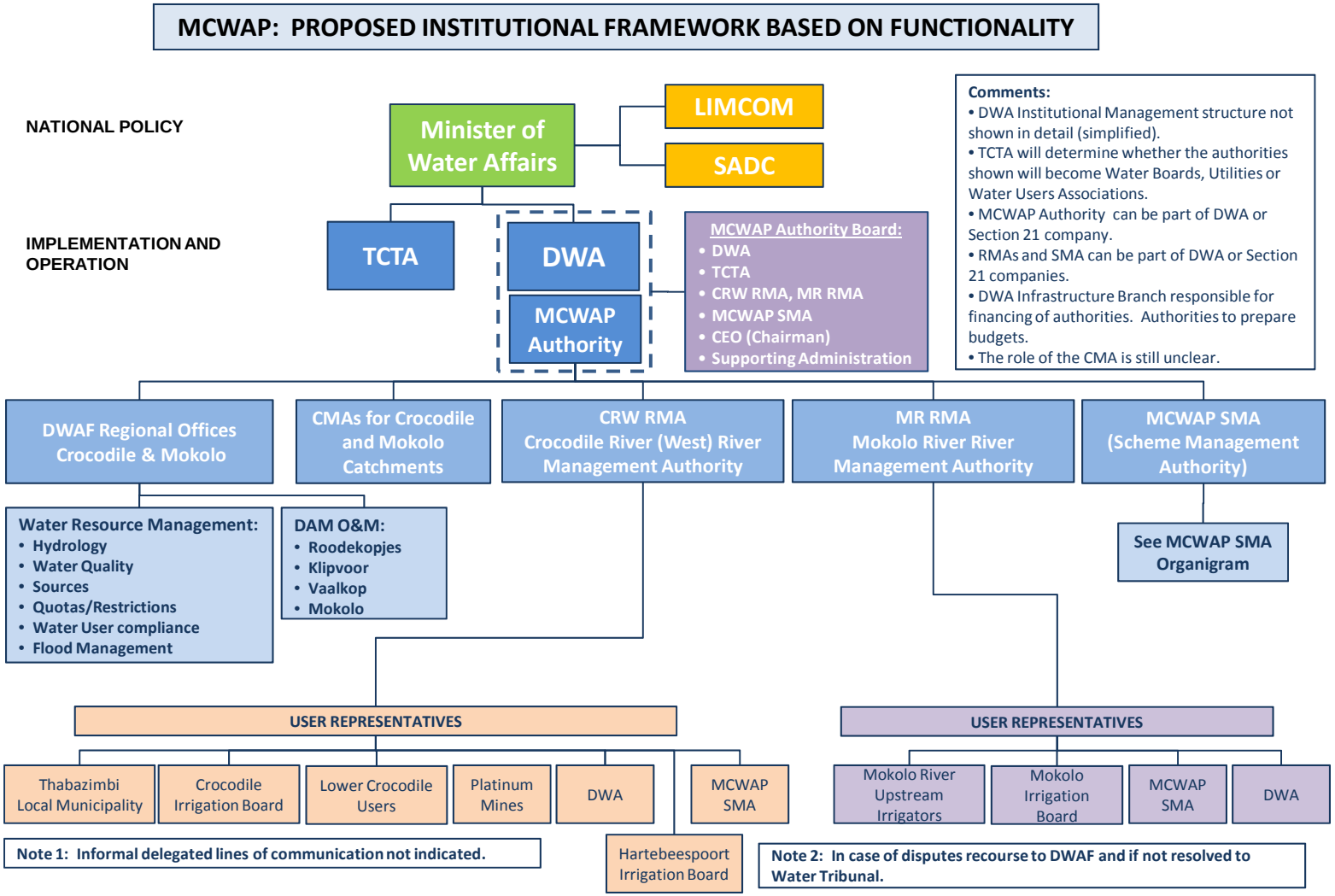

Figure 2-1: Proposed Functional Institutional Framework

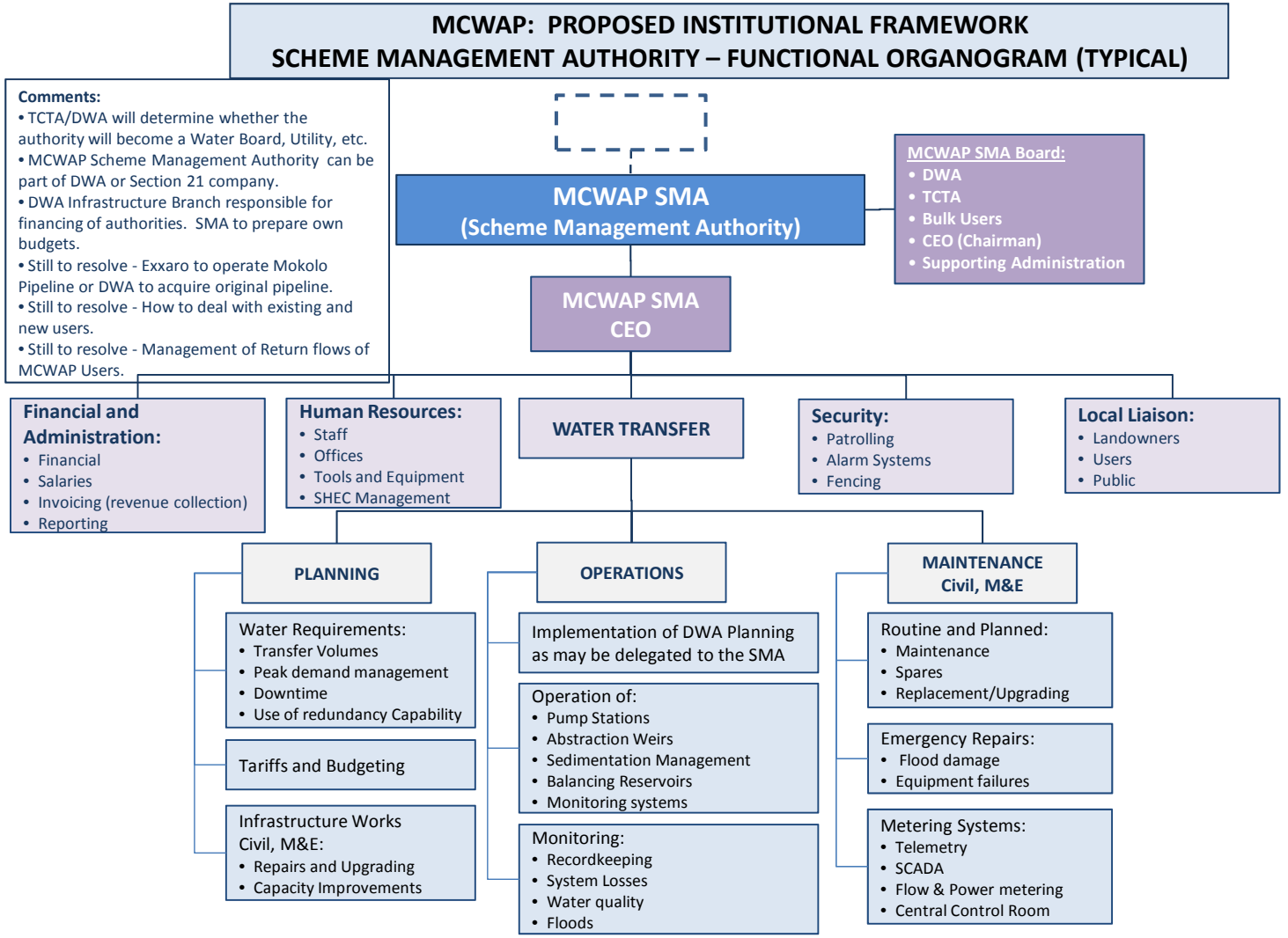

Figure 2-2: Scheme Management Organogram

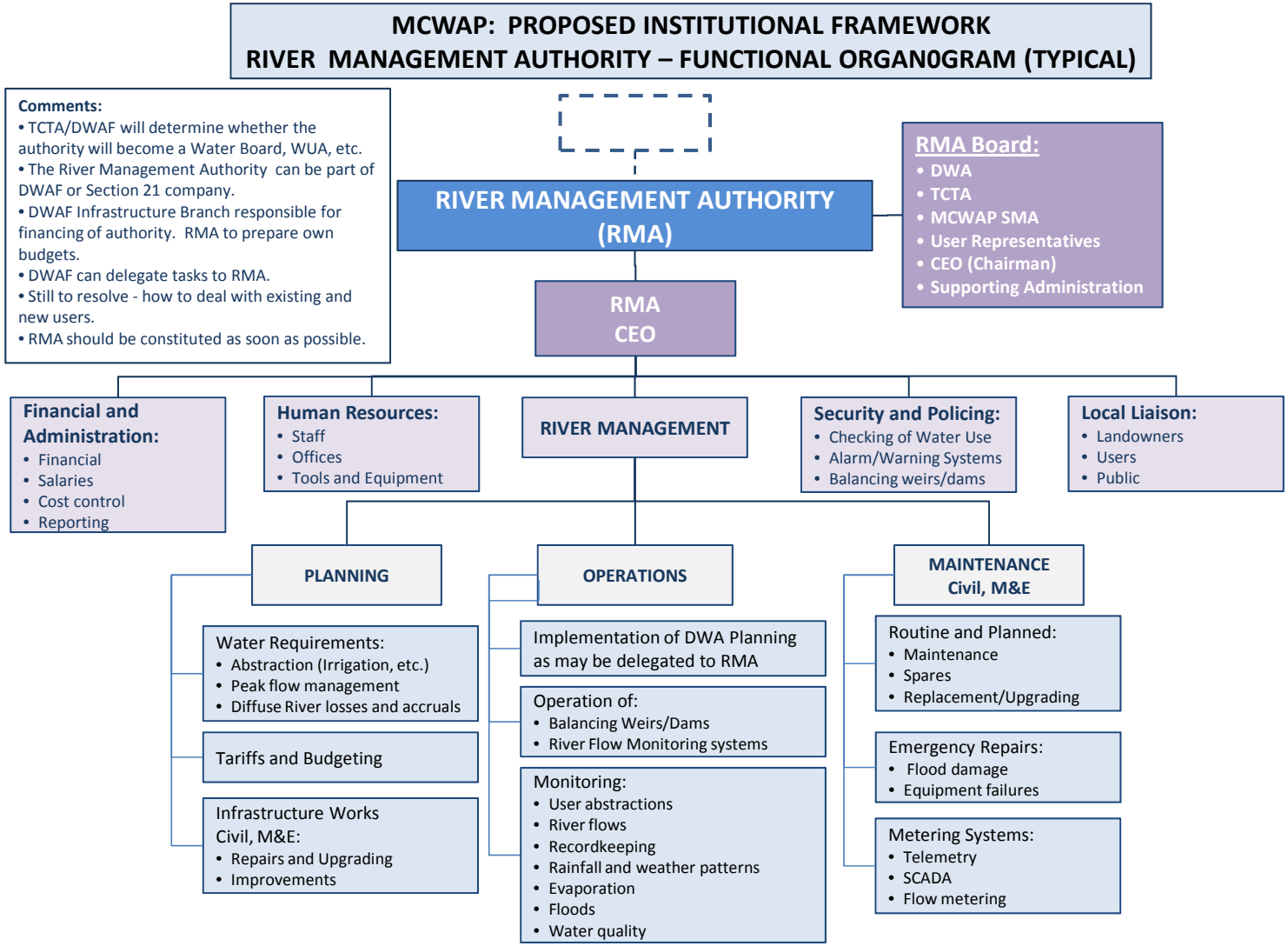

Figure 2-3: Proposed River Management Authority Organogram

Table 2-2: Staff and Skills Requirements – River Management Authority (RMA)

Position	Number (1) Required	Minimum Qualification	Skills Level	Skills (See Notes 2 and 3 below for responsibility Areas and locations) and General Remarks
CEO	1	Senior Pr. Eng. with a Degree in Engineering.	1	Strong management skills with a post-graduate qualification in water resource management preferable.
Personal Assistant	1	Secretarial diploma	5	
Financial Manager	1	Degree in commerce.	2	Experience with the management of the finances of government and local authorities will be a prerequisite.
Tariffs Clerk	1	Relevant occupation qualifications.	5	
Bookkeeper	1	Relevant occupation qualifications.	5	
Human Resources Officer	1	Relevant occupation qualifications.	3	Must have experience with the implementation of OSH and SHEC.
Planning Manager	1	Senior Pr. Eng. with a Degree in Civil Engineering.	2	Experience in the fields of planning, infrastructure and water resource management essential.
Planning Engineer	1	Degree or Diploma in Civil Engineering	3	Experience in the fields of planning, infrastructure and water resource management essential.
Water Resources Modeller	1	Degree or Diploma in Civil Engineering	3	Experience in designing and running of water resources and systems analysis models essential.
Operations Manager	1	Degree or Diploma in Mechanical Engineering	2	Experience in the operation of dams and weirs.
Operator	1 x 3 x 3 = 9	Relevant trade qualifications.	5	Located in Reach A, Reach C and Reach D, in 3 shifts per day. An additional team to be stationed in Head Office to rotate with others to cover for non-productive time.
Technical Assistant	1 x 3 x 3 = 9	Un-skilled or Semi-skilled.	6	
Instrumentation Technician	1 x 1 x 3 = 3	Technician (Electronics)	4	Must be able to operate and do basic maintenance and installations, order spares, download, collate and interpret data and report. Centrally located in the Head Office.
Maintenance Manager	1	Degree or Diploma in Mechanical Engineering	2	Experience in the maintenance of large M&E installations.
Electricians	1 x 3 x 1	Relevant trade	4	Maintenance of all electrical installations Reach A, Reach B, Reach C and

Position	Number [(1)] Required	Minimum Qualification	Skills Level	Skills (See Notes 2 and 3 below for responsibility Areas and locations) and General Remarks
	= 3	qualifications.		Reach D, but working centrally from Head Office, in 3 shifts per day.
Mechanics	1 x 3 x 1 = 3	Relevant trade qualifications.	4	Maintenance of pumps, valves, standby generators, cranes, etc. at installations in Reach A, Reach B, Reach C, and Reach D, in 3 shifts per day.
Tool hand/Labourer	3 + 3 = 6	Un-skilled or Semi-skilled.	6	
Security Manager	1	Diploma.	3	Relevant experience in providing security at strategic installations with good communication skills.
Security officer/patrol man	4 x 3 x 2 = 24	Relevant occupation qualifications.	6	Working in 2 teams consisting of 2 members in the security areas in Reach C and Reach D, in 3 shifts per day.
Local Liaison Officer	1	Diploma or degree in Communications.	3	Must be able to communicate effectively with users, farmers, other authorities, municipalities, etc. Verbal (meetings), written (newsletters) and electronic (web based) communication skills will be essential.
Cleaner/Messenger/office assistant	3 x 1 x 2 = 6	Un-skilled or Semi-skilled.	6	Stationed in each of the RMA offices.
TOTAL No. of STAFF				

Notes:

1. Number = Team size x No of Shifts x No. of Areas to be covered.
2. Main river reaches to be managed by the RMA will be (also refer to Figure 1-2):
   - **Reach A**: Main supply dams - Klipvoor, Hartebeespoort, Roodekopjes and Vaalkop Dams.
   - **Reach B**: Crocodile River (West) between the main supply dams and the Abstraction Works at Vlieëpoort.
   - **Reach C**: The Abstraction Weir at Vlieëpoort.
   - **Reach D**: Mokolo Dam.
3. RMA Head Office to be located in Thabazimbi (Vlieëpoort) with satellite offices located at Roodekopjes Dam (or Hartebeespoort Dam) and Mokolo Dam.
4. Skills levels 4, 5 and 6 will operate on a 24 hour shift basis.
5. Maintenance functions for Civil Works to be provided by DWA.
6. The staff requirements are based on the assumption that one RMA will be created to deal with both the Crocodile River (West) and Mokolo Dam areas of responsibility.

Table 2-3: Staff and Skills Requirements – Scheme Management Authority (SMA)

Position	Number (1) Required	Minimum Qualification	Skills Level	Skills (See Notes 2 and 3 below for responsibility Areas and locations) and General Remarks
CEO	1	Senior Pr. Eng. with a Degree in Engineering.	1	Strong management skills with a post-graduate qualification in infrastructure management preferable.
Personal Assistant	1	Secretarial diploma	5	
Financial Manager	1	Degree in commerce.	2	Experience with the management of the finances of government and local authorities a prerequisite.
Tariffs Clerk	1	Relevant occupation qualifications.	5	
Bookkeeper	1	Relevant occupation qualifications.	5	
Human Resources Officer	1	Relevant occupation qualifications.	3	Must have experience with the implementation of OSH and SHEC.
Planning Manager	1	Senior Pr. Eng. with a Degree in Civil Engineering.	2	Experience in the fields of planning, infrastructure and systems management essential.
Planning Engineer	1	Degree or Diploma in Civil Engineering	3	Experience in the fields of planning, infrastructure and systems management essential.
Systems Modeller	1	Degree or Diploma in Civil Engineering	3	Experience in designing and running of water resources and systems analysis models essential.
Operations Manager	1	Degree or Diploma in Mechanical Engineering	2	Experience in the operation of large pump stations and associated works.
Operator	1 x 3 x 4 = 12	Relevant trade qualifications.	5	Located in Area 1, Area 2 and Area 3, in 3 shifts per day. An additional team to be stationed in Area 4 to rotate with others to cover for non-productive time.
Technical Assistant	1 x 3 x 3 = 9	Un-skilled or Semi-skilled.	6	
Instrumentation Technician	2 x 3 x 1 = 6	Technician (Electronics)	4	Must be able to operate and do basic maintenance and installations, order spares, download, collate and interpret data and report. Centrally located in Area 4 (Head Office).
Maintenance Manager	1	Degree or Diploma in Electrical Engineering	2	Experience in the maintenance of large M&E installations.

Position	Number (1) Required	Minimum Qualification	Skills Level	Skills (See Notes 2 and 3 below for responsibility Areas and locations) and General Remarks
Electricians	1 x 3 x 1 = 3	Relevant trade qualifications.	4	Maintenance of all electrical installations in Area 1, Area 2, Area 3 and Area 4, in 3 shifts per day. Operating from the Head Office.
Mechanics	1 x 3 x 1 = 3	Relevant trade qualifications.	4	Maintenance of pumps, valves, standby generators, cranes, etc. at installations in responsibility Area 1, Area 2 and Area 3, in 3 shifts per day. Operating from the Head Office.
Tool hand/Labourer	3 + 3 = 6	Un-skilled or Semi-skilled.	6	
Security Manager	1	Diploma.	3	Relevant experience in providing security at strategic installations.
Area Security Manager	1 x 1 x 4 = 4	Relevant occupation qualifications.	4	Relevant experience providing security at strategic installations and managing patrol/security officers.
Security officer/patrol man	4 x 3 x 4 = 48	Relevant occupation qualifications.	6	Working in 2 teams consisting of 2 members in each security area (Area 1, Area 2, Area 3 and Area 4) in 3 shifts per day.
Local Liaison Officer	1	Diploma or degree in Communications.	3	Must be able to communicate effectively with users, farmers, other authorities, municipalities, etc. Verbal (meetings), written (news letters) and electronic (web based) communication skills will be essential.
Cleaner/Messenger/office assistant	4 x 1 x 4 = 16	Un-skilled or Semi-skilled.	6	Stationed in the offices in each of the areas of responsibility.
TOTAL No. of STAFF				

Notes:

1. Number = Team size x No of Shifts x No. of Areas to be covered.
2. Main Areas of Operation will be (also refer to Figure 1-2):
   - **Area 1**: Crocodile River (West) Abstraction Works (including Abstraction Weir, Low-lift Pump Station, Weir Electrical Switchyard, De-silting Works, Balancing Reservoir, High-lift Pump Station and Switchyard and Break Pressure Reservoir).
   - **Area 2**: Operational Reservoir and User Terminal Reservoirs. Also the alternative site for the Operational Control Centre.
   - **Area 3**: Mokolo Dam Pump Station and also supporting the sites at Wolwefontein and Zeeland/Medupi.
   - **Area 4**: Operational Control Centre.

3. SMA Head Office (Operational Control Centre) to be located at Vlieëpoort/Thabazimbi (alternatively at Operational Reservoir) with satellite offices at Vlieëpoort, the Operational Reservoir and at Mokolo Dam.
4. Skills levels 4, 5 and 6 will operate on a 24 hour shift basis.
5. Maintenance functions for Civil Works to be provided by DWA.

2.4. Functions and Responsibilities

2.4.1. MCWAP Authority Management Board

MCWAP Authority is an all-encompassing organisation. The objectives of the Authority would be to ensure:

(i) Management of the Water Resources.

(ii) Management of the river releases to all consumers along the Crocodile River (West) to the Abstraction Works at Vlieëpoort and from Mokolo Dam.

(iii) Management of the two water distribution systems to its consumers (the MCWAP Scheme).

The functions of the MCWAP Authority Management Board are:

- Determine the Authority's mission and purpose (this may well be determined by the Minister when the Authority is constituted).
- Elect the Chief Executive Officer (CEO).
- Support the CEO and review performance.
- Ensure effective organizational planning.
- Ensure adequate resources.
- Ensure that resources are managed effectively.
- Determine and monitor the Authority's performance.
- Enhance the Authority's public image.
- Internal dispute resolution.
- Assess its' own performance.

Similar functions and responsibilities should be allocated to the Boards of the Scheme Management and River Management Authorities.

2.4.2. River Management Authority (RMA)

The RMA is responsible to the MCWAP Authority and reports to the MCWAP Authority through the CEO of the MCWAP Authority. The objectives of the RMA are to monitor water resource management and to manage releases from the supply dams. The RMA will perform the following functions:

- Manages the determination of water requirements process by the Members in accordance with agreed guidelines and time schedules provided by the MCWSA.
- Collates water requirements and requests flow releases on behalf of the members from dams in Crocodile River (West) Catchment for irrigation, industrial and municipal use.
- Monitors and confirms user compliance with agreed water abstraction plans.

- Identifies and investigates reports of unauthorised water use in conjunction with the MCWAP Authority.
- Collates and checks water abstraction data for submission to the MCWAP Authority at agreed intervals.
- Reviews monthly and annual water supply and abstraction specifications and water loss and cost allocations and distributes to the Members for implementation and payment.
- Provides the MCWAP Authority with planning information for the preparation of short and medium term weekly forecasts of water requirements.
- Monitors the operation and maintenance of metering systems by Members in conjunction with the MCWAP Authority.
- Arranges and conducts regular RMA meetings.
- Monitors the quality of water abstracted from Mokolo Dam and the Crocodile River (West) and stored in the various balancing, operating and terminal reservoirs.

A single RMA could be formed to include for both the Crocodile River (West) and Mokolo River users, but separate authorities may be preferred by the users.

2.4.3. MCWAP Scheme Management Authority (MCWAP SMA)

The SMA is responsible to the MCWAP Authority and reports to the MCWAP Authority through the CEO of the MCWAP Authority. The objectives of the SMA are to monitor water resource management and releases from the supply dams and to manage the MCWAP Scheme. The SMA will perform the following functions:

2.4.3.1. Financial and Administration

- Budgeting.
- Income & expenditure (income will be from billing water users, expenditure will be from own cost + payments to TCTA & DWA & water levies; etc.).
- Staff salaries.
- Purchasing of materials, spares, equipment, etc.
- Administrative and legal functions.
- Insurances.
- Paying of expenses and repaying of loans of MCWAP SMA.
- For possible future loans incurred by MCWAP SMA for maintenance and other capital works such as river flow gauging stations.

2.4.3.2. Human Resources

- Appointments.

- Staff packages.
- Welfare.
- Recruitment.
- Training.

2.4.3.3. Security and Policing

- Maintenance of security structures.
- Responsible for security controls.
- Possibly assisting the RMA with monitoring of user water abstraction, as well as identification of unauthorised water use and follow up actions.

2.4.3.4. Local Liaison

- Develop and maintain good relationships with the RMAs and their Members.
- Hosting of regular co-ordination meetings with the RMAs and DWA Regional Office/CMAs.
- Regular communication through printed and electronic media.
- Attendance of RMA meetings.

2.4.3.5. Water Delivery

- Building and maintaining water requirement models.
- Determining and requesting flow releases from dams in Crocodile River (West) and Mokolo River Catchments.
- Determining requirements for:
  - measuring water abstractions
  - measuring river flow
  - measuring water quality
  - forecasting river flows accruals
  - forecasting river flow losses
  - disseminating data and records
- Operating and maintaining river flow gauging stations and weather stations in conjunction with DWA
- Monitoring, collecting and maintaining records of:
  - water abstractions
  - river flows
  - water quality
  - river flow accruals

  - river flow losses and allocation of these losses to unauthorised use and natural river losses
  - dam releases
- Preparing of monthly and annual water supply and abstraction specifications and reconciliations and allocating water losses and costs.
- Preparing of short and medium term monthly forecasts of water requirements and dam releases and informing of the dam operators (DWA).
- Determining of short and medium term water availability from Mokolo Dam.
- Monitoring of water quantities and rates of abstraction from Mokolo Dam and Crocodile River (West) and water delivered into and abstracted from Terminal Reservoirs.
- Abstraction of water from Mokolo Dam and Crocodile River (West) for users supplied by MCWAP.
- Day to day operation and maintenance of Mokolo Transfer Scheme and Crocodile River (West) Transfer Scheme, including abstraction weirs, low and high-lift pump stations, pipelines as well as balancing, operational and terminal reservoirs.
- Environmental monitoring and measurement of areas affected by MCWAP.
- Routine, planned and/or emergency maintenance, including:
  - Communications, instrumentation and control equipment and systems.
  - Electrical - medium and low voltage supply and distribution plus electrical switchgear, motors, etc.
  - Mechanical – pumps, valves, meters, pipelines etc.
  - Civil (pump stations, reservoirs, pipeline servitudes, access roads, valve chambers, etc.
  - Desilting of the various components of the abstraction works.
  - Weir basin, spillway channels and flank embankments. Clearing/cutting of vegetation, checking for excessive seepage, undercutting, outflanking and instituting remedial measures as may be required.
  - Arranging for and assisting with dam safety inspections for MCWAP abstraction works and reservoirs.
  - Flood protection works including improvements and repairs following flood damage to MCWAP.
  - Clearing of debris resulting from flood events.

2.4.4. DWA/Catchment Management Authorities

DWA will be responsible for the overall water source management in the Crocodile River (West) and Mokolo River, receives and evaluates water requirements from the SMA and RMAs, incorporates these requirements into the water source management plan and issues directives accordingly. The functions of DWA are as follows:

- Determination of additional releases possible and required for flood attenuation and mitigation from Roodekopjes, Klipvoor, Vaalkop and Mokolo Dams.
- Determination of transfers of water required from other catchments to catchment of Crocodile River (West).
- Issue water use licences for Mokolo River and Crocodile River (West) catchments.
- Determine and advise MCWSA of water availability and curtailments along the Crocodile and Mokolo Rivers.
- Liaise with and inform the Governments of the Republics of Botswana, Mozambique and Limpopo in accordance with the Revised SADC protocol and the LIMCOM Agreement of:
  - Planning and studies for the MCWAP.
  - Intended additional water use from the Limpopo Watercourse for the MCWAP.
  - Intended transfers by South Africa into the Limpopo Watercourse from other watercourses for use of MCWAP.
  - Data and other information concerning and affecting the supply of water to and use of water from the Limpopo Watercourse for the MCWAP.
- Monitoring water use from the Mokolo and Crocodile River (West) watercourses and ensuring compliance by water users with water use entitlements and curtailments.
- Monitoring of water quality in the Mokolo Dam in conjunction with the RMA.
- Monitoring of water quality in the Crocodile River (West) catchment downstream of the Klipvoor, Roodekopjes and Vaalkop Dams in conjunction with the RMA.

2.4.5. TCTA

TCTA will be responsible for the implementation of the Scheme and after construction, in conjunction with DWA, for the overall operations and maintenance management of the Scheme through the various Authorities. TCTA will be represented on the boards of the MCWAP Authority, SMA and the RMAs. The primary functions of the TCTA will be as follows:

- Management and financing of the design and implementation of MCWAP.
- Appointment of Professional Service Providers.
- Appointment of Contractors.
- Ensure that the Scheme is fully functional for hand-over to the MCWAP SMA.
- Provide the necessary financial oversight with regards to its responsibility for servicing the loans.