water affairs

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Water Affairs
REPUBLIC OF SOUTH AFRICA

Water Requirements and Availability Reconciliation Strategy for the Mbombela Municipal Area

Inception Report

January 2012

APPROVAL

Report Title		Inception report
Study Name		Water Requirements and Availability Reconciliation Strategy for the Mbombela Municipal Area
DWA Report No.		PWMA 05/X22/00/2012
Submitted by		IWR Water Resources in association with Aurecon (Pty) Ltd SRK Consulting Engineers and Scientists (Pty) Ltd Kyamandi Development Services (Pty) Ltd, and Manzezulu Development Planning (Pty) Ltd ARQ (Pty) Ltd Postnet Suite 40 Private Bag X4 Menlo Park 0102
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Report Status	:	Final
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Director

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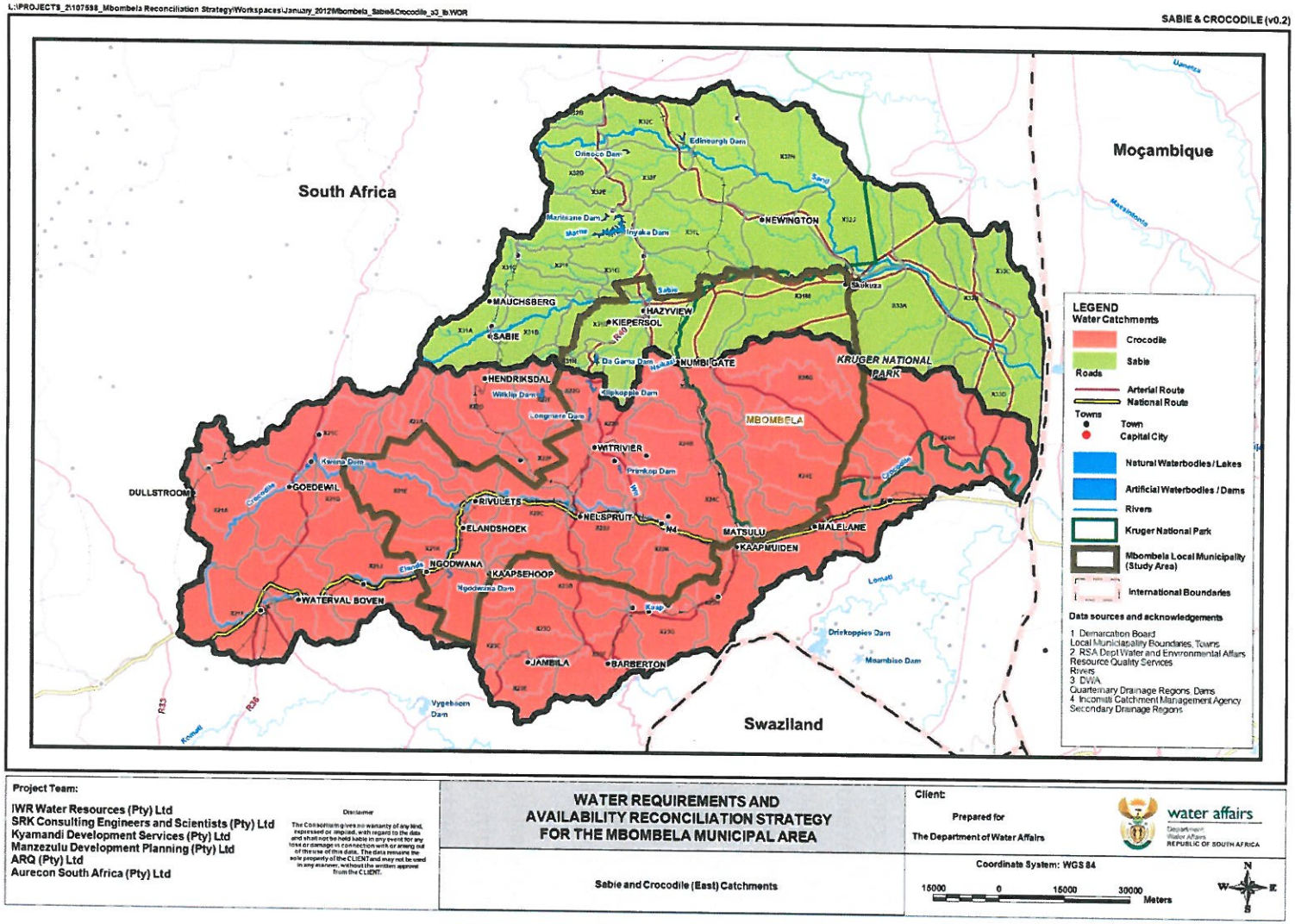

Figure 1.1: Study Area with Catchments

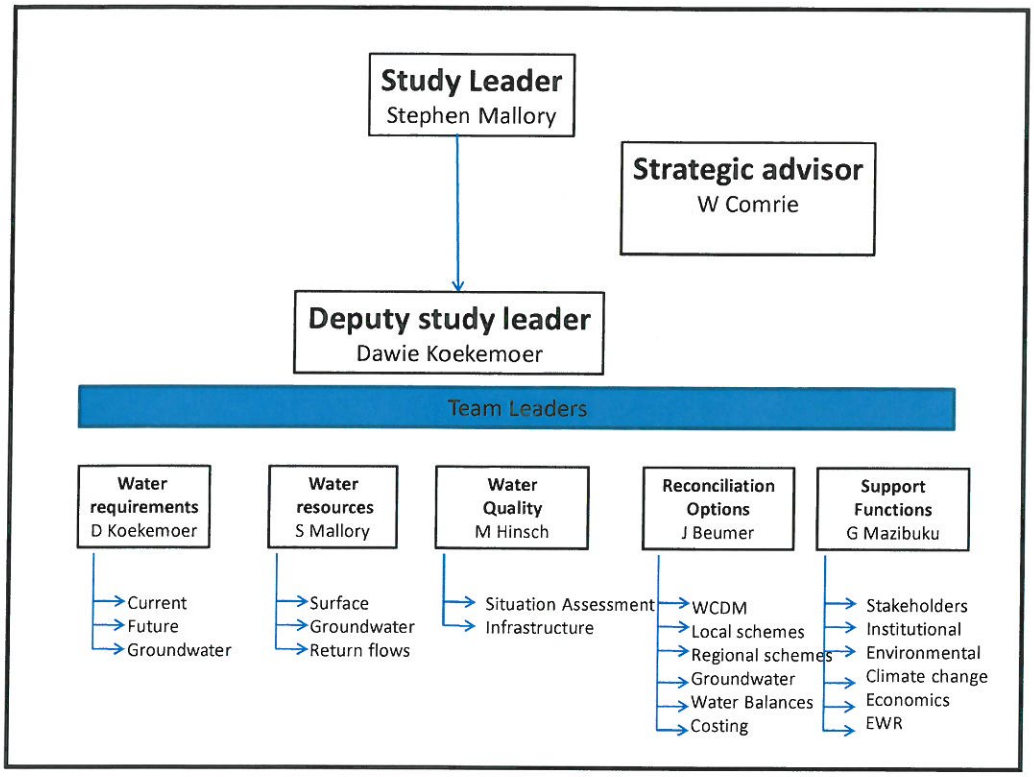

Figure 1.2: Study Team: Study and Task Leaders

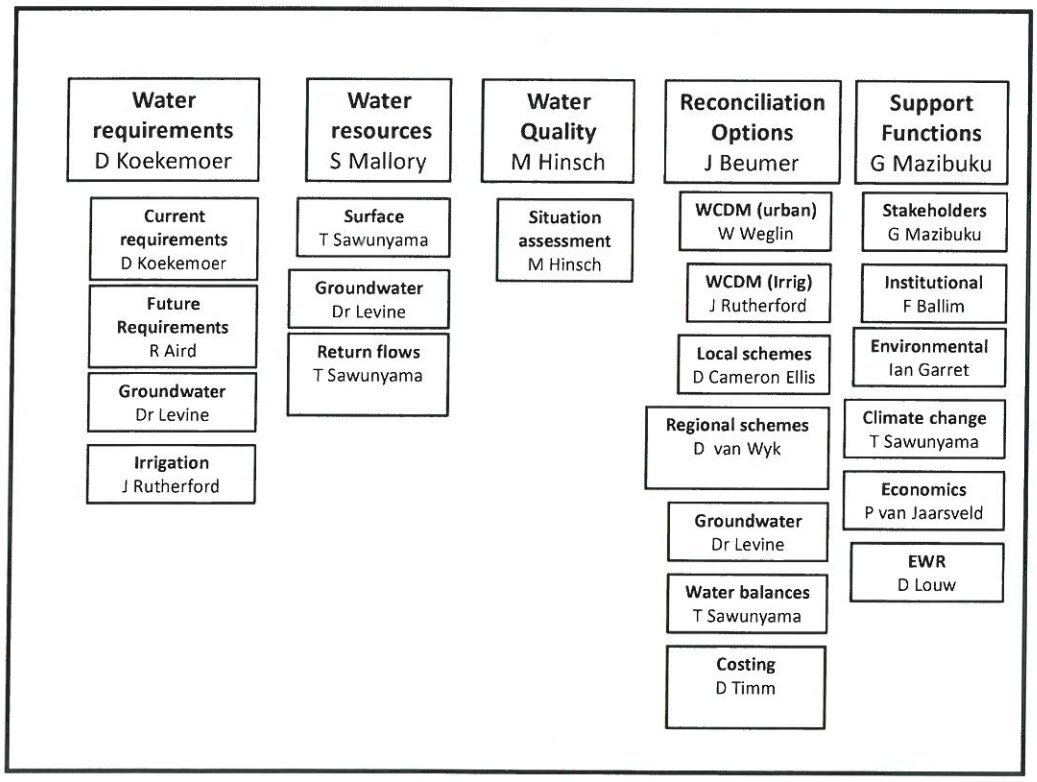

Figure 1.3: Study Team: Task teams

upland IAPs from riparian IAPs, so that scenarios that entail removing only riparian IAPs can be modelled.

3.5.9 Task 5.8: Industrial water use

SAPPI's paper mill at Ngwodwana is the only major industrial user in the study area. While SAPPI's current water use is stable and well documented, it is understood that the process at the mill is to be changed, which will probably result in a change in water use. The managers at the mill will be interviewed in order to obtain data regarding their projected future water requirements.

3.6 Task 6: Current water resources and possible augmentation options

3.6.1 Background

The surface water resources of the MLM itself are not specifically relevant to the study: rather, the catchments within which the MLM falls (i.e. the Crocodile and Sabie River catchments) need to be fully understood. These catchments were modelled in detail as part of the IWAAS, and these model setups are available in the Water Resource Yield Model (WRYM-IMS).

An understanding of the dynamics relating to assurance of supply is of crucial importance in these catchments. Irrigators in particular operate at very low assurance of supply, with decisions on the level of restrictions to be imposed being made on a weekly basis. The WRYM as set up as part of the IWAAS did not, however, model the system at this level of detail. This short-coming of the IWAAS model setup will need to be resolved as part of this reconciliation study. The methodology presented at the 2005 South African National Chapter of the of International Association of Hydrological Sciences (SANCIAHS) symposium by Mallory, and originally used in the development of the draft Water Allocation Plan and the Catchment Management Strategy for the Inkomati WMA is proposed. The methodology entails modelling the catchments as they are operated, i.e. using the restrictions currently imposed on irrigators (and other user sectors) in order to duplicate the assurances of supply actually experienced by irrigators. A similar approach is now being adopted in the Mhlatuze catchment in support of compulsory licensing.

The water resources modelling for the Mbombela Reconciliation strategy will include the catchments upstream of the MLM and take into account the following factors:

- Direct abstractions (irrigation, industrial, domestic);
- Afforestation;
- Alien vegetation;
- Return flows;
- Farm dams;
- Pumping to off-channel storage (eg Primkop Dam);
- Ecological Water Requirements (EWRs);
- Downstream requirements, including international requirements, and
- Operating rules of dams and run-of-river users.

3.7 Task 7: Water quality

3.7.1 Background

The water quality assessment will entail:

- Assessing the water quality requirements of various categories of water users, and
- Determining the impact on the quality of the water resource of discharges of waste, and water containing waste.

Information about pollution sources within the MLM will be synthesised, and sources of pollution from the upstream catchment/s will be considered. The effluent discharged from the Ngwowana Paper Mill into the Crocodile River, and numerous WWTWs within the MLM will receive special attention during the study. We are aware that from time to time there are high levels of iron and manganese in the Crocodile River east of Nelspruit. As these high levels occur as spikes we believe that they are caused by uncontrolled discharges and investigations will be conducted to identify the possible sources.

The water quality component of the Mbombela Reconciliation Strategy will be completed within a six-month timeframe.

Manda Hinsch (Situation assessment)
Joyce Mathole (support)Walter Johannes (WWTW)
Teboho Mofokeng (WWTW)

3.7.2 Task 7.1: Water Quality Situation assessment

3.7.2.1 Sub-Task 7.1.1: Characterise the current situation and historical trends

The purpose of this component of the study is to describe the water quality requirements for the domestic, agricultural, industrial, environmental and recreational water use sectors. Existing available information to characterise the current water quality situation of the Mbombela Municipality will be reviewed, and an analysis of historical trends will be undertaken. Different user sectors have different water quality requirements, and/or differing concerns about the same water quality constituents.
If necessary, the requirements will be made site-specific to account for local conditions, such as types of crops cultivated (salt sensitive or insensitive; various irrigation methods) and presence of geological formations (old marine deposits; clays), etc.
Broadly, this will involve:

- identifying and characterising the main water uses;
- determining the typical water quality issues or problems experienced by the main water users;
- identifying the water quality constituents associated with each problem or issue, and
- specifying a target water quality range for each of the key constituents.

3.7.2.2 Sub-Task 7.1.2: Formulate and record water-related issues, concerns and problems

The purpose of this component is to identify the key water quality issues or potential water quality problems in the study area.

3.8.2 Task 8.1: Devising the criteria and developing the multi-criteria decision support tool

A list of possible criteria against which the reconciliation options will be evaluated will be discussed with the TSG where agreement will be reached on which criteria to use. If necessary (i.e if the decision between reconciliation options becomes difficult because of too many options or criteria) a multi-criteria support tool will be used to select the most appropriate reconciliation options.

3.8.3 Task 8.2: Water conservation and water demand management (Municipal Sector)

The levels of Non Revenue Water (NRW) will be established for all major urban and rural demand centres in the study area. The basic information will be obtained through normal communication channels and/or site visits. The information will be captured for each demand centre in the latest International Water Association methodology and is ideally suited to such water audits.

It is not envisaged that any detailed field work will be undertaken (e.g. logging etc) however, where logging results are readily available and are considered of value to the assessment they may be used.

Having reviewed the existing WC/WDM strategy for each demand centre, a meeting will be set-up with the WSA's to discuss these WC/WDM strategies. The mains objective of these meetings would be to establish:

- status quo on the implementation of the WC/WDM strategy;
- discussion of water balance and scorecard;
- results from the various interventions;
- problems and possible solutions for implementing a WCDM project; and
- prioritising of key projects and development of a realistic implementation programme.

The project team will ensure that the goals set by the WSA are realistic and that the savings can be achieved within the current constrains. The project team will attempt to identify the "quick fix" projects whereby major savings can be achieved for limited capital investment. The Project Team will also assess the results and derive an estimate of the potential savings that can be achieved through WDM interventions based on existing business plans, practical experience and available case studies. The methodology has already been established and used in the Vaal, Kwa-Zulu Natal, Levuvuhu/Lethaba Reconciliation strategies.

It is imperative that the targets set in the strategy are realistic and the goals are met as it has a direct implication on future augmentation schemes. The WC/WDM strategies will be reviewed after 12 to 18 months to assess whether the targets have been met. Should it be found that the targets are unrealistic, the WC/WDM will be changed accordingly.

The ***deliverables*** from this task will include:

- Annual water audits for all main urban and rural water demand centers
- An assessment of the potential savings that can be achieved through WC/WDM and the associated budgets and timelines.
- An assessment of previous projects undertaken in the area and the success rate,

Potential local groundwater schemes such as the dolomitic aquifer between the Sudwala caves and Ngodwana will be identified and costed; conjunctive use with surface water will also be considered.

3.8.8 Task 8.7: Water balances

The water balance for each of the towns or groupings of towns in the MLM will be determined for present and future scenarios. The timing and sequencing of intervention schemes will be determined with the aid of the MS Excel Water Balance Model tool, developed by Aurecon. The model was already used on a number of reconciliation studies, including the study for the Olifants WMA which is adjacent to the Inkomati WMA.

3.8.9 Task 8.8: Assessment of water services infrastructure

The assessment of problems and constraints with respect to water supply infrastructure and water treatment, wastewater treatment and effluent disposal will be undertaken as follows:

- Obtain the asset registers, maintenance schedules and records, blue and green drop accreditation of the municipality, Water Board, Concessionaire, and other stakeholders;
- Evaluate the information received;
- Verify the information through spot checks;
- Determine the risk factors in respect of the existing infrastructure;
- Obtain information on the operation of the works and the infrastructure, including budget and staffing information:
- Obtain information on the maintenance of the infrastructure, including systems, schedules, budgets, and staff.
- Evaluate the information on the O&M of the infrastructure;
- Determine the status quo of O&M;
- Undertake a risk assessment of O&M, and
- Compile a summary report on the problems and risks associated with the infrastructure.

3.8.10 Task 8.9: Reconciliation strategy development

3.8.10.1 Sub-task 8.7.1: The preliminary reconciliation strategy

A preliminary strategy will be developed with readily available information. The aim of the strategy will be to provide a plan of action to reconcile water requirements with available resources up to the year 2035. The strategy will include demand and supply side interventions with the emphasis on water demand management. The preliminary strategy will be presented to the Steering Committee and Stakeholders.

3.8.10.2 Sub-task 8.7.2: The final reconciliation strategy

Based on the outcomes of the Steering Committee and 1st stakeholder meeting, a final strategy will be developed. The will take into account Future water requirements and return flow scenarios (high, low and most likely growth) up to 2035.

3.9.3 Task 9.3: Second stakeholder meeting

A second stakeholder meeting will be held towards the middle of the project in order to present the final strategy.

3.9.4 Task 9.4: Public meeting

A Public meeting will be held towards the end of the project in order to present the final strategy to the broader public.

3.9.5 Task 9.5: Newsletters

Newsletters will be distributed after the first and second stakeholder meetings as well as the Public meeting (same newsletter as the second stakeholder meeting). These newsletters will be limited to 6 columns on 2 x A4 pages. The PSP will be responsible for the technical content of the newsletters but DWA will print the newsletters.

The proceedings of the stakeholder meetings will be accurately recorded together with comments made and questions raised. These proceedings will be included in the Project Reports.

3.9.6 Task 10: Institutional aspects

The institutional capacity of DWA (Mpumalanga Regional Office), MLM and the ICMA to manage the water resources within the MLM will be analysed and compared with accepted international norms. The analysis will be done via interviews with the Human Resources managers of the above three institutions.

The analysis of institutional capacity will take approximately two months and will be carried out within the first year of the study.

This task will be undertaken by Faeeza Ballim.

3.10 Task 11: Environmental screening

3.10.1 Background

The objective of this task is to undertake environmental screening of each of the reconciliation strategy options under investigation. This will entail:

- Studying the Mpumalanga Biodiversity Conservation Plan (MBCP);
- Summarising any key environmental issues that should be taken into account when considering and comparing options;
- Identifying any environmental fatal flaws and significant concerns, and
- Reviewing legislation to determine whether any environmental authorisations will be required for any of the projects.

The screening exercise will be undertaken within the context of the existing IDPs, Strategic Development Frameworks and any relevant Environmental Management Frameworks.

4 STUDY PROGRAMME

Task number	Task description	2011		2012												2013			
		N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
0	Study management																		
1	Study Initiation																		
2	Basic information gathering																		
3	Inception report																		
4	Current and future water																		
5	Water resources																		
6	Water quality																		
7	Reconciliation options																		
8	Stakeholder participation																		
9	Institutional aspects																		
10	Environmental screening																		
11	Climate change																		
12	Economics																		
13	Skills transfer																		
14	Ecological water requirements																		
15	Reporting																		
	WCDM																		
	Preliminary strategy																		
	Final strategy																		

◆ Draft report submitted

◆ Final report submitted

Figure 4.1: Study programme

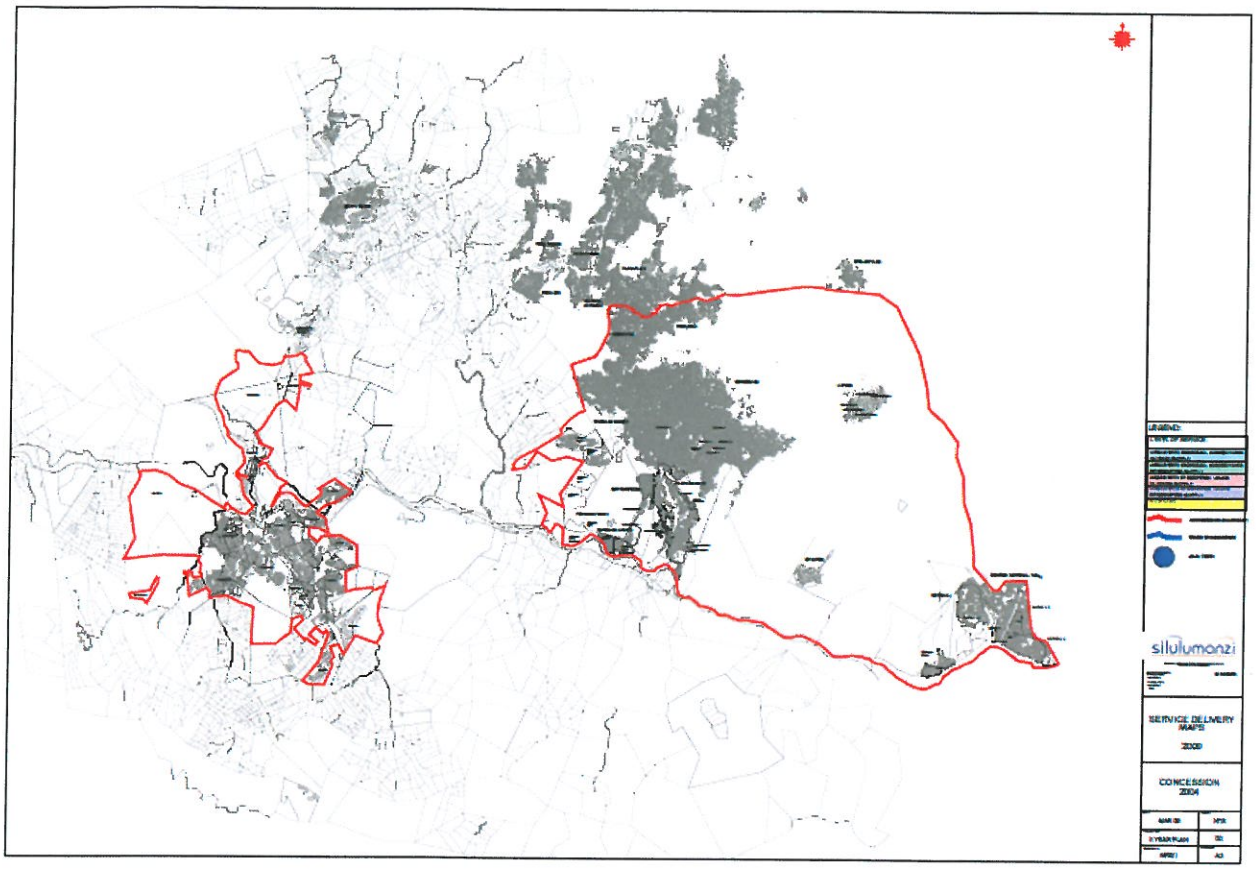

Figure A1: Sembcorp Silulumanzi concession area

The First Order Reconciliation Strategy for Nelspruit and White River (DWA, 2009) indicates that there is huge potential for WC/WDM in the area which is summarised as follows :

There is potential for reducing water losses and improving water use efficiency among consumers. With the estimated water losses of 34% (Silulumanzi, 2007), there is potential to save approximately 7.87 Ml/d (2.8 million m3/a) in Nelspruit alone, assuming 10% NRW as accepted standard. This volume is significant and therefore priority should be given to implementing WC/WDM measures in Nelspruit and White River. A WC/WDM strategy and business plan was developed by DWA which could be used to motivate for funding of the identified intervention measures (Water for Africa (Pty) Ltd, 2008).

Implementing water conservation and demand measures will not solve the future water requirements of Nelspruit but will reduce the additional water requirement from 21.3 million m3/a to 18.5 million m^3/a for the high growth scenario.

The 2009/10 NRW figure for the Sembcorp Silulumanzi concession area is 41% with the demand continuously growing and the billed consumption declining over the past three years. Discussions with the concessionaire also indicated that there are large parts of the rural areas which are operating on intermittent supply and consumer metering and billing is very difficult in the rural areas. Mbombela LM has not been able to provide proper NRW figures and it is therefore expected their NRW figures are worse than for the concession area. The average consumption in the area is about 300l/c/d. Issues to consider in estimating the potential savings include:

ANNEXURE C

RECORDS OF MEETINGS

Table C1 provides a summary of the meetings have taken place since the initiation of the study on @@ @@@ 2011 @@Stephen please fill@@

Table C1: Record of meetings

Record of meetings		
Date	**Purpose**	**Present**