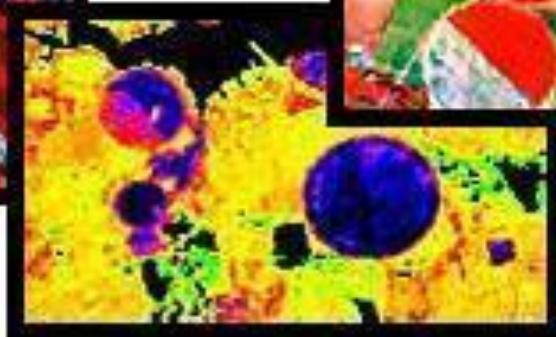
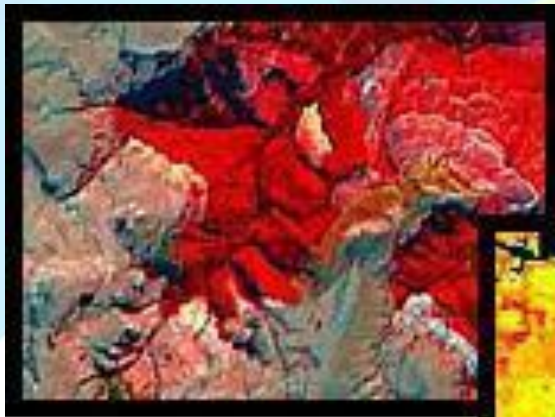




SCHOEMAN AND PARTNERS

Company profile



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Introduction

SCHOEMAN and PARTNERS was established in 1983 as a multi-disciplinary engineering firm, specialising in agricultural engineering. After 34 years of business we also have considerable experience in water resource management and planning, water use modelling and monitoring, water use licensing, remote sensing and management information systems.

Commissions are accepted throughout Southern Africa and Africa under leadership of experienced and competent engineers and project managers, with our Head Office situated in Brits, North- West and a branch office in Moinooi.

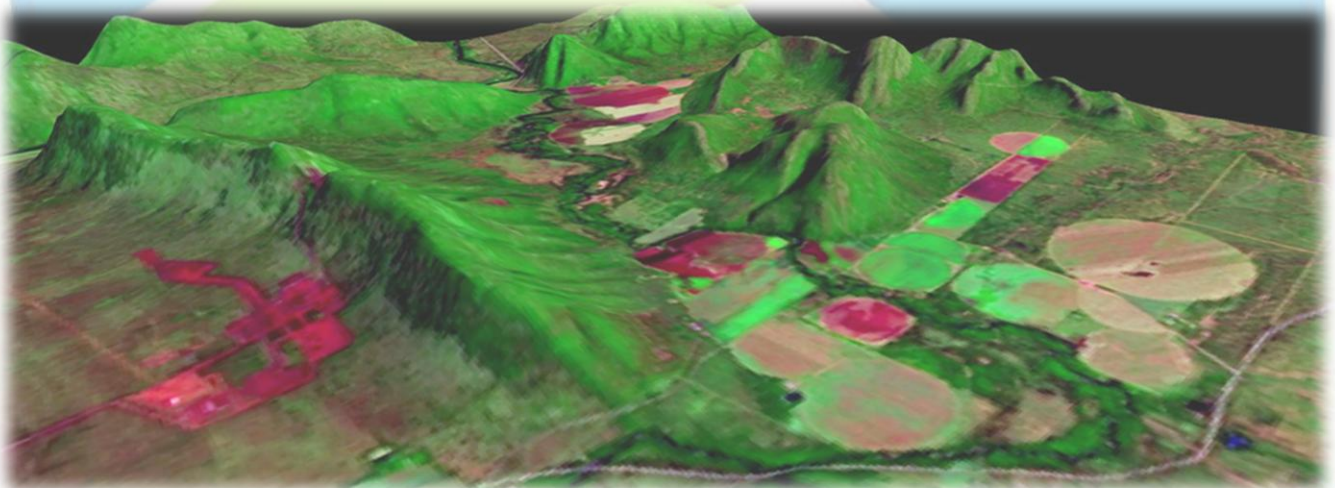
- Water related aspects are part of the speciality field - particularly water use entitlements and maintenance and control thereof. Detail cadastral information and spatial data on water and land utilization on farms are collected, processed and analysed. The processing is computerized on alpha-numerical and graphical information systems to facilitate control, management and planning.
- The development of management information systems, with special reference to water use management is a key activity of the firm. Numerous installations of our in-house developed WURM (**w**ater **u**se **r**egistration **m**odule) served as platform for the registration of water uses. Specific GIS-oriented management information systems for water user associations and catchment management agencies are developed and tailored to the needs of each client.
- A specialist field of the firm is expert evidence in water and land use related legal matters.
- Specialist knowledge regarding remote sensing, with specific reference to satellite imagery, was developed in partnership with the Satellite Application Centre of the CSIR at Hartbeeshoek. Satellite images are used to create near real colour composite images on which irrigation development, dams and pollution can clearly be identified. Linked with GIS information like property boundaries, roads, towns, catchment boundaries, title deed data, etc., fully fledged Geographical Information Systems are developed to satisfy the needs of our clients.

Profile of experience:

The experience in the firm can be divided into the following disciplines:

- I. Agricultural engineering**
- II. Management systems development**
 - *CAD systems*
 - *Data base management*
 - *GIS*
- III. Hydraulics**
- IV. Hydrology**
 - *Flood peak estimation*
 - *Mathematical modelling*
 - *Risk analysis*
 - *Simulation and system analysis*
- V. Irrigation**
 - *Crop water requirement determination*
 - *Farm dam design*
 - *Drainage*
 - *System design*
- VI. Legal aspects**
 - *Water law*
 - *Expropriation law*
 - *Land restitution claims*
- VII. Project management**
- VIII. Water source planning and development**
- IX. Water utilisation**
- X. Water Use Licence Applications**

A list of approximately 1 500 projects completed over the past 34 years is available on request.



Specialist abilities

WATER USE DETERMINATION, ASSESSMENT AND THE DEVELOPMENT OF WATER MANAGEMENT, WATER CONSERVATION AND WATER DEMAND MANAGEMENT PLANS



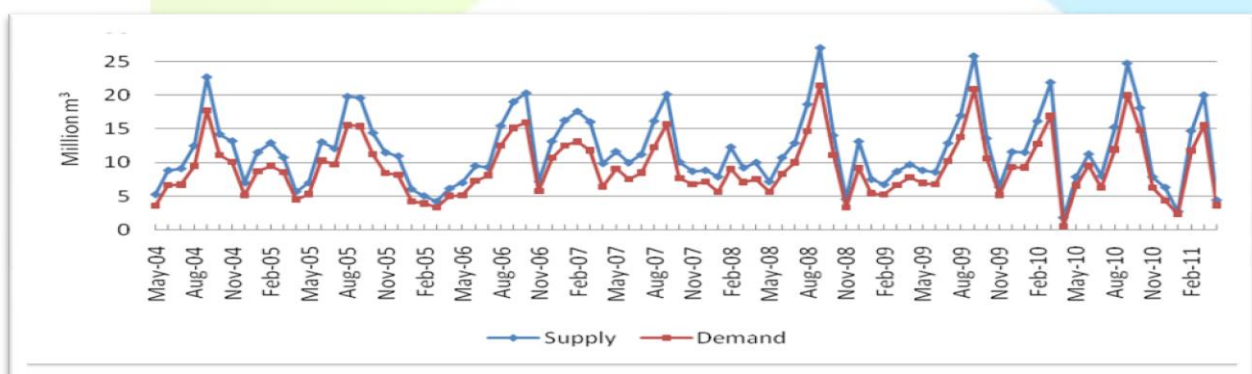
While it is increasingly being recognized that improved water allocation mechanisms are imperative to sustainable development, poverty alleviation and biodiversity preservation, there is an increasing demand for water from the agricultural, industrial, mining and domestic sectors while meeting the ecological water requirements. It is a strategic challenge to meet the current competing demands while considering the need to meet future water requirements.

Schoeman and Partners has been involved in various studies calling for the determination of water use (especially agricultural use) through remote sensing methods, in order to:

- *Assess the current water use and water use practices in irrigation agriculture,*
- *Assess the scale and capacity to reduce losses in conveyance infrastructure and on-farm applications where applicable,*
- *Examine the options for conveyance loss reduction and the conditions required to stimulate decisions to attract investment in conveyance loss reduction,*
- *Review on-farm irrigation systems and the policy instruments for improving irrigation efficiency,*
- *Develop a strategy for implementing WC/WDM in the irrigation sector, taking current and planned initiatives into account.*

The company is able to calculate the theoretical water requirements of identified irrigation development for specific catchments (as specified by the client) and to generate a time series (on a monthly resolution) for the theoretical irrigation requirements and the practical (“actual”) requirements, based on both a growth model and a fixed model of irrigation development in every catchment.

Where modelling is contemplated, records can be generated and used as input for other modelling applications.



SURVEYS FOR THE DETERMINATION OF WATER USE ENTITLEMENTS IN TERMS OF PREVIOUS AND CURRENT WATER LEGISLATION

Schoeman and Partners is able to determine through field surveys and desktop studies the nature of water usage inside and outside of government water control areas. This information is computerised and reported according to the needs of the client. Project management occurs within budget. Advice and assistance are offered with the determination of water rights, management aspects and liaison with water users.

During the survey process title deeds are thoroughly investigated. The title deed information of each property is obtained and checked through electronic linkage with the Deeds Office. Where queries arise, the original title deed is traced and investigated. Property boundaries, acquired from the Surveyor-General, are annotated on enlarged aerial photographs. A hard copy file, containing the survey questionnaires, is compiled for each property in the area.

Survey technicians visit each property by appointment. During the visit information of the property is checked with the owner, addresses obtained and information on irrigation practice is added. Cultivated lands and potentially irrigable areas are annotated on the aerial photographs.

Pump stations are visited, photographed and outlet works surveyed. Ampere and pressure gauge readings of the pump and system are taken. Flow rates are measured with a 'Doppler'-effect flow meter. With this information the abstraction rate of the system is determined or calculated.

Wall lengths and heights of all dam walls are surveyed, while the full supply level is also determined. Reservoir capacities are calculated with standardised and tested formulae, or by computerised analysis of digital elevation models.

All relevant areas are digitised from the aerial photographs or satellite imagery, stored and transferred to the data base in which all the survey information is compiled.

With A0 to A4 colour printers available, reports are completed with relevant maps, graphs and lists according to the needs of the client.

Specific database programs are developed and tuned for detail analyses of the data according to the client's needs. Applications are developed, wherewith standard needs of the clients are met: e.g. allocation tables, schedules of rateable areas, voters' rolls and address lists, in a publishable format.

The data base is also directly linked to spatial data resulting in a complete graphical information system (GIS) at the completion of the project. Applications have already been developed to convert this GIS to any standard GIS system, e.g. *ESRI* range of software.



The knowledge and experience exist to analyse the available data in terms of the previous and the current National Water Act. During this procedure, hydrological analyses are done to determine the normal flow and surplus flow components of the particular public stream and water uses are validated using remote sensing methods. As a result of the involvement of the firm as expert witness in several water court cases, water use entitlement actions and expropriation actions, the necessary expertise exists to present all analyses in such a way that it can be used in any relevant legal action.

Because water related aspects are part of the speciality field - particularly water use entitlements and maintenance and control thereof, Mr H. N. Schoeman (Managing Director) was appointed by the Minister of Water Affairs and Forestry to serve on the "Water Law Review Panel" **The purpose of this panel was to draft a set of principles on which the new National Water Act could be based.**

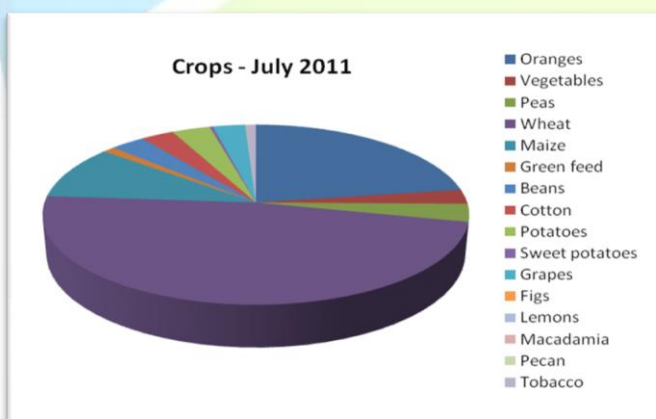
DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEMS

A robust application for the in-field registration of water uses was developed for the Department of Water and Sanitation, within two months after receiving the original brief. This program, called WURM (**w**ater **u**se **r**egistration **m**odule), was successfully implemented by various regional offices of DWS, Transnet, Safcol and a number of consultants employed by DWS to assist in the registration process.

During the initial capturing phase of the WURM-implementation, data from various sources and platforms was successfully transferred into WURM. The sources varied from governmental sources like the Title Deed office and the office of the Surveyor- General, to several propriety databases from various consultants. The original data platforms varied from DOS, UNIX and Windows operating systems, contained in some very esoteric formats like HBase and RBase, and also in DBase, Excel, MS Access and Paradox.

WURM was further developed to also serve as the data-capturing and reporting front end for the water use management information system. As all cadastral, title deed, land use, crops, irrigation systems, water works, water sources and water resources information are captured on WURM and GIS, the resultant information system exceptionally lends itself to proper water management. The implementation is very user-friendly and requires minimal resources and training.

A further management information system was developed for the Magaliesberg Citrus Company. In this implementation all spatial and alpha-numerical data of the growers are represented in a manner that facilitates proper planning, management and strategic positioning in the market place.



The information at the disposal of clients is sometimes enormous but not always easily accessible. Schoeman and Partners has developed a fully operational Water Management Information Tool for the Directorate: Water Utilisation which contains

all the survey information of the most recent projects. This Information tool is self-contained and consists of an easy to use GIS-based front-end and data viewer. No special software licence or high performance hardware is necessary to run the application.

WATER USE LICENCE APPLICATIONS

In terms of the National Water Act (NWA) (Act No 36 of 1998) a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. Schoeman and Partners specialises in the formal preparation and submission of water use licence applications on behalf of our clients utilising the online Water Use Licence Application and Authorisation System (e-WULAAS).

The firm handles the complete process which *inter alia* includes:

- Consultation and liaison with the Department of Water and Sanitation
- Liaison with other Government Departments where necessary
- Conducting Public Participation if required
- Commissioning and managing required specialist studies
- Development of a Technical Report
- Assistance with Section 27 motivations
- Completion of License Application Forms

PARTNERSHIP WITH EMERGING CONSULTANTS AND AFFIRMATIVE ACTIONS WITHIN THE FIRM:

This firm actively support forming joint ventures with emerging consultants. The firm was previously in various partnerships with emerging consultants. Other partnerships, if required, can be formed.

FEE STRUCTURE:

The proposed fee structure will be as prescribed by the Engineering Profession of South Africa Act, or as agreed with the client

Project experience

1: WATER RESOURCE MANAGEMENT AND PLANNING

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client |
|----------------|---|---|---------------------------|--|
| 2015 – present | Crocodile River (West) Irrigation Scheme - Monitoring of water requirements and irrigation development | Schoeman and Partners was appointed by the Crocodile River West Irrigation Board to evaluate and monitor irrigation water use and expansions on a quarterly basis (using satellite imagery) in order to ensure that water users remain within the allocated water quotas and to ensure that new developments stay within the allocated volumes. | Ongoing | Crocodile River (West) Irrigation Board Koedoeskop South Africa |
| 2016 - present | Mokolo Water User Association – Monitoring of irrigation and development of a Water Management Plan | Schoeman and Partners was appointed by the Mokolo Water User Association to evaluate and monitor irrigation water use and expansions on a quarterly basis (using satellite imagery) in order to ensure that water users remain within the allocated water quotas and to ensure that new developments stay within the allocated volumes. The project also includes the development of a comprehensive Water Management Plan. | Ongoing | Mokolo Water User Association Lephalale South Africa |
| 2017 - present | Great Letaba Water User Association - Irrigation and Compliance Monitoring | Schoeman and Partners was appointed by the Great Letaba Water User Association to evaluate and monitor present irrigation water use in order to ensure that water users remain within the allocated water. Properties where the possibility exists of users abstracting more than what they are entitled to, are flagged for detail investigations | Ongoing | Great Letaba Water User Association Tzaneen South Africa |
| 2017 | Determination of the irrigation demands - Al Dhaid Project - UAE | Schoeman and Partners was appointed by Halcrow International Partnership to provide them with information for the Al Dhaid irrigation project in the UAE. The project included the determination of crop water requirements, choosing appropriate irrigation methods and the determination of peak flow requirements. | 6 | Halcrow International Partnership, Sharjah Branch United Arab Emirates |
| 2015 | Determination of irrigation demands of the Katete, Kibimba And Mubuku Irrigation Schemes - Uganda | Schoeman and Partners was appointed by ILISO Consulting to provide them with information for three envisaged irrigation projects in Uganda (the Katete (Matanda alternative), Mubuku II and Kibimba Irrigation Projects). The project included the determination of crop water requirements, choosing appropriate irrigation methods and the determination of peak flow requirements. | 9 | ILISO Consulting Uganda |
| 2013 | Development of a Reconciliation Strategy for the Luvuvhu and Letaba Water Supply System | Schoeman and Partners was appointed by WRP Consulting as part of the team to develop a Reconciliation Strategy for the Luvuvhu and Letaba Water Supply System. The duties included the identification and digitising of afforestation for 1998 and 2013. The identification and digitising of irrigation for the various catchments. Apportionment of water abstracted from dams or water abstracted from run-of river. Assimilation of all data in a GIS and submission of findings to the modelling team. | 7 | WRP Consulting Pretoria South Africa |
| 2010 | Auditing of the detailed design and cost estimates for the Zambezi Integrated Agro-commercial Development Project | Schoeman and Partners were appointed by ILISO Consulting to audit the irrigation demands, as set out by Tahal, and if they are representative of the crops, irrigation systems and climatic conditions foreseen for the Zambezi Integrated Agro-commercial | 6 | ILISO Consulting Botswana |

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client |
|-------------|---|--|---------------------------|---|
| | | Development Project as indicated by Tahal in their document "2010 July Response to Comments on VOI. 2+3: Attachment-3.doc" | | |
| 2010 - 2013 | Development and implementation of Irrigation Water Management Plans to improve water use efficiency in the agricultural sector. | The Department of Water and Sanitation appointed Tlou Consulting (Pty) Ltd in association with Schoeman and Partners to undertake the "Development and Implementation of Irrigation Water Management Plans to Improve Water Use Efficiency in the agricultural Sector". The primary objective of the study was the development and implementation of irrigation WMPs for 14 irrigation schemes to improve water use efficiency in the agricultural sector. The following actions were inter alia undertaken for each scheme: (a) Situation assessment of the current water use and irrigation water use practices, (b) Determining the irrigation water budget and establishing water use baseline for each scheme, (c) Determining the irrigation water management issues based on the situation assessment and water budgets prepared for each irrigation scheme, (d) Identification of opportunities to improve water use efficiency, (e) Benchmarking of irrigation water use efficiency and setting irrigation water use efficiency targets for each scheme, (f) Preparing an irrigation water management plan for each irrigation scheme, (g) Capacity building of the WUAs to implement the identified opportunities to improve irrigation water use efficiency | 26 | Department of Water and Sanitation Directorate: Water Use Efficiency Pretoria South Africa |
| 2008 | Development of a comprehensive Water Conservation and Water Demand Management Strategy and Business Plan and pilot implementation for the Crocodile West/Marico Water Management Area | Schoeman and Partners in association with Tlou Consulting were appointed by DWS to comprehensive Water Conservation and Water Demand Management Strategy and Business Plan and pilot implementation for the Crocodile West/Marico Water Management Area. The project included the following tasks (a) Assessing the current water use and water use practices in irrigation agriculture, (b) Assessing the scale and capacity to reduce losses in conveyance infrastructure and on-farm applications where applicable, (c) Examining the options for conveyance loss reduction and the conditions required to stimulate decisions to attract investment in conveyance loss reduction, and (d) Reviewing on-farm irrigation application systems and the policy instruments for improving irrigation efficiency. | 36 | Department of Water and Sanitation Directorate: Water Use Efficiency Pretoria South Africa |

2: WATER USE ENTITLEMENTS

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client |
|-------------|--|--|----------------------------------|---|
| 2014-2017 | Validation of water use entitlements - Umfolozi Sugar Planters Ltd | Schoeman and Partners was appointed by the Umfolozi Sugar Planters Ltd to undertake the evaluation of water use by members of the Company. The results were presented to the DWS to assist them with the validation and verification of water use entitlements on the properties included in the study. | 36 | Umfolozi Sugar Planters Ltd Mtubatuba South Africa |
| 2012 – 2016 | The Crocodile (West)-Marico Water Management Area: Validation and Verification of existing lawful water use | Schoeman and Partners in association with Invirocon and Tlou Consulting were appointed by DWS: North West Region for the validation/verification of all water use in the Crocodile (W) and Marico WMA. | 36 | Department of Water and Sanitation North West Region Mmabatho South Africa |
| 2012 – 2014 | Validation of small scale rural registrations and agricultural schemes and Verification of all water uses in the Limpopo Water Management Area. | Schoeman and Partners in association with Invirocon were appointed by DWS: Limpopo Region for the validation/verification of water use in the Limpopo WMA. | 18 | Department of Water and Sanitation Limpopo Region Polokwane South Africa |
| 2010 – 2015 | Addressing Unlawful Irrigation Water Use In The Vaal River System | Schoeman and Partners in association with Iliso Consulting were appointed by DWS: Gauteng Region to address outstanding Validation and Verification aspects, Identify, quantify and address aspects of unlawful water use and Implement compliance monitoring and enforcement measures for the Upper, Middle and Lower Vaal WMAs | 42 | Department of Water and Sanitation Gauteng Region Pretoria South Africa |
| 2010 – 2012 | Validation and verification of registered water users in the Steelpoort system - downstream of De Hoop Dam (including DWSrs River) and the Flag Boshielo Dam downstream to Olifantspoort. | Schoeman and Partners was appointed by DWS: Mpumalanga Region for the validation/verification of water use in certain priority areas of the Olifants WMA. | 9 | Department of Water and Sanitation Mpumalanga Region Mbombela South Africa |
| 2008 – 2012 | Validation and verification of registered water users in the Western block comprising the Lephalele catchment (A5) and Nyl/Mogalakwena catchment (A6) of the Limpopo Water Management Area | Schoeman and Partners in association with Thompson & Thompson and JJ Wessels were appointed by DWS: Limpopo Region for the validation/verification of water use in the Western Block of the Limpopo WMA. | 21 | Department of Water and Sanitation Limpopo Region Polokwane South Africa |
| 2008 – 2009 | Validation : Witbank area. | Schoeman and Partners were appointed by Kumba Resources Limited to identify possible water sources for new mining operations in the Witbank area. The focus is on the validation of identified registered water use and the preliminary determination of existing lawful water use. Validation reports on each property were submitted to DWS- Mpumalanga region for evaluation and confirmation of existing lawful water use. | 9 | Kumba Resources Limited Johannesburg South Africa |
| 2007 – 2010 | Provision of technical assistance for ad-hoc validation and other sections of the National Water Act in the Upper Vaal WMA | Schoeman and Partners in association with Thompson & Thompson and JJ Wessels were appointed by DWS for the provision of technical assistance for ad-hoc validation and other sections of the National Water Act in the Upper Vaal WMA. This includes the whole Section 35 process, Section 33 evaluations, Licence applications and validations. | 30 | Department of Water and Sanitation Gauteng Region Pretoria South Africa |

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client |
|-------------|--|---|---------------------------|--|
| 2007 – 2009 | Validation and verification of water use registrations in the Croc/Marico WMA | Schoeman and Partners in association with Zitholele Consulting, Thompson & Thompson and JJ Wessels were appointed by DWS for the validation/verification of water use registration information in the Crocodile/Marico WMA. | 18 | Department of Water and Sanitation North West Region |
| 2007 | Rapid validation of water use in the Steenkoppie Dolomitic compartment. | Schoeman and Partners was appointed by the Magalies River Crisis Committee to undertake the rapid validation of water uses within the Steenkoppie Dolomitic Compartment in order to determine possible unlawful water use and to assist the Department in the issuing of Directives to the identified transgressors. | 3 | Magalies River Crisis Committee Magaliesburg South Africa |
| 2007 – 2008 | Validation : Tarlton area. | Schoeman and Partners was appointed by the several water users in the Tarlton area to validate registered water use and to make preliminary determinations on the extent of existing lawful water use. Validation reports on each property to be submitted to DWS - North West Region for evaluation and confirmation of existing lawful water use. | 12 | Tarlton water users Tarlton South Africa |
| 2006 – 2008 | Validation of water use registrations in the Middle Vaal WMA | The Schoeman and Partners, Karin Bowler enterprises & JJ Wessels was appointed by DWS and completed the validation of water use registration information in the Middle Vaal WMA. | 18 | Department of Water and Sanitation Free State Region South Africa |
| 2006 – 2007 | Validation and verification of water use registrations in the Mokolo River Catchment | The COPAD/Schoeman and Partners Karin Bowler enterprises & JJ Wessels was appointed by DWS for the validation/verification of water use registration information in the Mokolo River Catchment. | 12 | Department of Water and Sanitation National Water Resource Planning Pretoria South Africa |
| 2006 | Methods for the rapid identification of unlawful water use. | Schoeman and Partners was appointed by the Director: Water Resource Management Support to assist in the development of methods to identify unlawful water use through a process of rapid validation. Procedures for the legal handling of such transgressions were also developed. | 2 | Department of Water and Sanitation Water Resource Management Support, Pretoria South Africa |
| 2006 | Validation: Sterkstroom | Schoeman and Partners was appointed by the Sterkstroom water forum to undertake the validation of water use on properties riparian to the Sterkstroom River, a tributary of the Mokolo River. | 6 | Sterkstroom Water Forum Vaalwater South Africa |
| 2005 – 2006 | Validation - Midmar Dam Catchment. | Schoeman and Partners was appointed by the éLan Group to undertake the validation of water use on various properties that were identified as possible candidates for the acquisition of water use entitlements. The purpose of the study was to assist DWS in the verification of existing lawful water use on these properties. | 13 | éLan Group Durban South Africa |
| 2005 | Validation: Delmas area. | Schoeman and Partners was appointed by the Delmas water forum to validate registered water use and to make preliminary determinations on the extent of existing lawful water use. Validation reports on each property were submitted to DWS- Mpumalanga region for evaluation and confirmation of existing lawful water use. | 8 | Delmas Water Forum Delmas South Africa |
| 2004 | Validation: Steelpoort River | The Schoeman and Partners/Copad Consortium was appointed by DWS: Options | 4 | Department of Water and Sanitation |

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client |
|-------------|--|--|---------------------------|---|
| | | Analysis for the verification of water use registration information and the preliminary determination of existing lawful water use on properties along the Steelpoort River downstream of the proposed De Hoop dam. | | Directorate: Options Analysis Pretoria South Africa |
| 2003 | Schoonspruit dolomitic compartment Groundwater Resource Assessment - Uses & Users | Schoeman and Partners was appointed by DWS: Free State region to conduct a desk-top study to determine existing and current water uses mainly to distinguish between existing lawful use of water and unlawful water uses. | 7 | Department of Water and Sanitation Free State Region Bloemfontein South Africa |
| 2002 – 2003 | Field Survey and verification of water use registrations along the Liebenbergsvlei River | A detail field survey was completed in 2002 along the Liebenbergsvlei river. The main focus of the project was to: (a) ensure that all water uses were registered, (b) verify the extent and lawfulness of registered water uses and (c) identify and report any transgressions. | 9 | Department of Water and Sanitation Gauteng region Pretoria South Africa |
| 2001 - 2004 | Validation and verification of water use registrations in the Upper Vaal WMA. | The Schoeman and Partners/Copad Consortium was appointed by DWS-Gauteng region for the validation/verification of water use registration information in the Upper Vaal Water Management Area. Schoeman and Partners was the lead consultant. | 28 | Department of Water and Sanitation Gauteng Region Pretoria South Africa |

3: MANAGEMENT INFORMATION SYSTEMS

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client |
|-------------|---|---|----------------------------------|--|
| 2007 | Validation and verification of water use registrations in the Croc/Marico WMA | Schoeman and Partners in association with Zitholele Consulting, Thompson & Thompson and JJ Wessels was appointed by DWS for the validation/verification of water use registration information in the Crocodile/Marico WMA. <u>A robust application for the in-field registration of water uses was developed for the DWS within two months after receiving the original brief. This program, called WURM (water use registration module), was successfully implemented by various regional offices of DWS, Transnet, Safcol and a number of consultants employed by DWS to assist in the registration process.</u> | 18 | Department of Water and Sanitation North West Region Mmabatho South Africa |
| 2006 | Methods for the rapid identification of unlawful water use. | Schoeman and Partners was appointed by the Director: Water Resource Management Support to assist in the development of methods to identify unlawful water use through a process of rapid validation. Procedures for the legal handling of such transgressions were also developed. | 2 | Department of Water and Sanitation Water Resource Management Support Pretoria South Africa |
| 2004 | CON 2001: Guide to determine the lawfulness of existing water use | The purpose of this Guide was to set out procedures to determine whether the registered water use is a possible over, under or correct registration. The law, tools and procedures contained in the Guide and the answers derived from using the Guide can also be used to determine other aspects necessary to enhance effective water resource management. | 6 | DIFD Department of Water and Sanitation Head Office Pretoria South Africa |
| 2003 | Registration and correction of water use data on the Water Authorisation and Registration Management System (WARMS) in the nine DWS Regional Offices. | The BKS (Pty) Ltd/Schoeman en Vennote Joint Venture was appointed to assist the DWS with the registration and correction of water use data on WARMS. In addition to technical assistance with error checking, correcting and reporting, the project involved data capturing and correction. The focus of the project was on preparing the data for the release of the new version of WARMS. This new version required new data standards and quality assurance reports were generated to highlight possible data errors, which were then checked and corrected. Other tasks included in the project were the implementation of a bar coded file-tracking system and training of new DWS officials appointed to work on the WARMS system. | 10 | Department of Water and Sanitation Head Office Pretoria South Africa |
| 2001 | Validation and verification of water use registrations in the Upper Vaal WMA. | The Schoeman and Partners/Copad Consortium was appointed by DWS-Gauteng region for the validation/verification of water use registration information in the Upper Vaal Water Management Area. Schoeman and Partners was the lead consultant. <u>During the project various databases were developed to track the progress on the validation process, tracking of hard copy files, validation results, etc. These were/are inter alia used to provide information to the project management team.</u> | 28 | Department of Water and Sanitation Gauteng Region Pretoria South Africa |
| 1999 | Compilation of an archive register of field survey information | Schoeman en Vennote was appointed to compile a register and archive database of all the properties included in various field surveys undertaken or commissioned by the Department. A comprehensive database was developed to <i>inter alia</i> provide information on each project including properties, available reports and supporting data (aerial photographs, maps, etc.) | 3 | Department of Water and Sanitation Directorate: Water utilization Pretoria South Africa |

4: DETERMINATION AND CLASSIFICATION OF LAND AND/OR WATER USE

| Year | Project name | Responsibilities / Duties | Project Duration (months) | Client | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|--|-----------------------------------|----------------------|------|------------------------|------|-----------------------|------|---------------------------------|------|---------------------|------|-------------------------|------|---------------------|------|----------------------------|------|------------------------|------|--------------------------------|------|---------------------|------|--------------------------------|------|-------------------|------|------------------------------|------|----------------------------|------|---------------|------|------------------|------|----------------------|------|----------------|------|--------------------|------|-------------------------|------|--------------------|------|--------------|------|------------------------|------|--------|------|-----------------------------------|------|------------------|------|--------------|------|----------|------|-----------|------|--------|--|--|--|--|
| 1984 - 1999 | Field surveys on behalf of DWS to determine the nature of water usage inside and outside of Government Water Control Areas. | <p>Various field survey projects were completed on behalf of the Department between 1984 and 1999. The main purpose of these surveys was to determine the nature and extent of water uses within the study area. Apart from detailed information gathering and processing, hydrological analyses were done to determine the normal flow and surplus flow components of the particular public stream(s). The following projects, including the start date, were successfully completed:</p> <table border="0"> <tr> <td>1984</td> <td>Magalakwin</td> <td>1990</td> <td>Pongola</td> </tr> <tr> <td>1984</td> <td>Marico</td> <td>1990</td> <td>Elephants River (Oudsthoorn)</td> </tr> <tr> <td>1984</td> <td>Buffelspoort</td> <td>1992</td> <td>Grootdraai (Vaal River)</td> </tr> <tr> <td>1985</td> <td>Klein Vaal</td> <td>1992</td> <td>Langkloof (Paul Sauer Dam)</td> </tr> <tr> <td>1985</td> <td>Lomati</td> <td>1993</td> <td>Sterkfontein Dam (Wilge River)</td> </tr> <tr> <td>1986</td> <td>Hans Strijdom</td> <td>1993</td> <td>Weyers River</td> </tr> <tr> <td>1986</td> <td>Breede River</td> <td>1993</td> <td>Langtouw River</td> </tr> <tr> <td>1987</td> <td>Tarltou Subterranean GWCA</td> <td>1993</td> <td>Carolina GWCA</td> </tr> <tr> <td>1987</td> <td>Mogol (Planning)</td> <td>1993</td> <td>Tenbosch pump survey</td> </tr> <tr> <td>1987</td> <td>Magalies River</td> <td>1994</td> <td>Groot-Letaba River</td> </tr> <tr> <td>1988</td> <td>Breede River (Planning)</td> <td>1994</td> <td>Onrus River Valley</td> </tr> <tr> <td>1988</td> <td>Lower Marico</td> <td>1994</td> <td>Molatedi Dam catchment</td> </tr> <tr> <td>1988</td> <td>Koster</td> <td>1994</td> <td>Schoonspruit dolomite compartment</td> </tr> <tr> <td>1989</td> <td>Crocodile (East)</td> <td>1994</td> <td>Komati River</td> </tr> <tr> <td>1989</td> <td>As River</td> <td>1994</td> <td>Nyl River</td> </tr> <tr> <td>1989</td> <td>Palala</td> <td></td> <td></td> </tr> </table> | 1984 | Magalakwin | 1990 | Pongola | 1984 | Marico | 1990 | Elephants River (Oudsthoorn) | 1984 | Buffelspoort | 1992 | Grootdraai (Vaal River) | 1985 | Klein Vaal | 1992 | Langkloof (Paul Sauer Dam) | 1985 | Lomati | 1993 | Sterkfontein Dam (Wilge River) | 1986 | Hans Strijdom | 1993 | Weyers River | 1986 | Breede River | 1993 | Langtouw River | 1987 | Tarltou Subterranean GWCA | 1993 | Carolina GWCA | 1987 | Mogol (Planning) | 1993 | Tenbosch pump survey | 1987 | Magalies River | 1994 | Groot-Letaba River | 1988 | Breede River (Planning) | 1994 | Onrus River Valley | 1988 | Lower Marico | 1994 | Molatedi Dam catchment | 1988 | Koster | 1994 | Schoonspruit dolomite compartment | 1989 | Crocodile (East) | 1994 | Komati River | 1989 | As River | 1994 | Nyl River | 1989 | Palala | | | | |
| 1984 | Magalakwin | 1990 | Pongola | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1984 | Marico | 1990 | Elephants River (Oudsthoorn) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1984 | Buffelspoort | 1992 | Grootdraai (Vaal River) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1985 | Klein Vaal | 1992 | Langkloof (Paul Sauer Dam) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1985 | Lomati | 1993 | Sterkfontein Dam (Wilge River) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1986 | Hans Strijdom | 1993 | Weyers River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1986 | Breede River | 1993 | Langtouw River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1987 | Tarltou Subterranean GWCA | 1993 | Carolina GWCA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1987 | Mogol (Planning) | 1993 | Tenbosch pump survey | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1987 | Magalies River | 1994 | Groot-Letaba River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1988 | Breede River (Planning) | 1994 | Onrus River Valley | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1988 | Lower Marico | 1994 | Molatedi Dam catchment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1988 | Koster | 1994 | Schoonspruit dolomite compartment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1989 | Crocodile (East) | 1994 | Komati River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1989 | As River | 1994 | Nyl River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1989 | Palala | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1999 - 2001 | Determination and classification of land use | <p>Numerous projects were commissioned by the State Attorney and other clients to determine and classify land use on specified dates for land restitution and expropriation cases. All analyses and results had to be presented in such a way that it could be used in any relevant legal action and the firm was called as expert witness in several cases to testify. Some of the major projects were:</p> <table border="0"> <tr> <td>1999</td> <td>Ten Bosch Land Claim</td> <td>2000</td> <td>Marsfontein Land Claim</td> </tr> <tr> <td>2000</td> <td>Mabaalstad Land Claim</td> <td>2000</td> <td>Kruger National Park Land Claim</td> </tr> <tr> <td>2000</td> <td>Mooketsi Land Claim</td> <td>2001</td> <td>Lydenburg Land Claim</td> </tr> <tr> <td>2000</td> <td>Litswalo Land Claim</td> <td>2001</td> <td>Goedgelegen Land Claim</td> </tr> <tr> <td>2000</td> <td>Brakfontein Land Claim</td> <td>2007</td> <td>Nwamitwa Dam Expropriation</td> </tr> <tr> <td>2000</td> <td>The Rest Land Claim</td> <td>2010</td> <td>Spring Grove Dam Expropriation</td> </tr> <tr> <td>2000</td> <td>Levubu Land Claim</td> <td>2017</td> <td>Tongaat Waterfall Land Claim</td> </tr> <tr> <td>2000</td> <td>Louis Trichardt Land Claim</td> <td></td> <td></td> </tr> </table> | 1999 | Ten Bosch Land Claim | 2000 | Marsfontein Land Claim | 2000 | Mabaalstad Land Claim | 2000 | Kruger National Park Land Claim | 2000 | Mooketsi Land Claim | 2001 | Lydenburg Land Claim | 2000 | Litswalo Land Claim | 2001 | Goedgelegen Land Claim | 2000 | Brakfontein Land Claim | 2007 | Nwamitwa Dam Expropriation | 2000 | The Rest Land Claim | 2010 | Spring Grove Dam Expropriation | 2000 | Levubu Land Claim | 2017 | Tongaat Waterfall Land Claim | 2000 | Louis Trichardt Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1999 | Ten Bosch Land Claim | 2000 | Marsfontein Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | Mabaalstad Land Claim | 2000 | Kruger National Park Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | Mooketsi Land Claim | 2001 | Lydenburg Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | Litswalo Land Claim | 2001 | Goedgelegen Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | Brakfontein Land Claim | 2007 | Nwamitwa Dam Expropriation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | The Rest Land Claim | 2010 | Spring Grove Dam Expropriation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | Levubu Land Claim | 2017 | Tongaat Waterfall Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | Louis Trichardt Land Claim | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |