



PROFILE

SCHOEMAN AND PARTNERS
CONSULTING ENGINEERS

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FOUNDED:	1 December 1983	1 January 1994
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SCHOEMAN and PARTNERS is a multi disciplinary engineering firm with offices in Brits and Mooinooi, with a satellite office in Pretoria. Commissions are accepted country wide and are executed under leadership of experienced and competent engineers. The firm handles civil - , structural - and agricultural engineering assignments.

The firm is actively involved in the practical training and mentoring of young professional and technical persons out of poor and disadvantaged communities through mentoring, bursary and/or employment opportunities. There is also ongoing cooperation and joint ventures with BEE firms in concomitant engineering fields and assignments. This creates opportunities for synergy and exchange of knowledge and experience.

- Water related aspects are part of the speciality field - particularly water use rights 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. Specific GIS-oriented management information systems for water user associations and catchment management agencies are at present being developed.
- A specialist field of the firm is expert evidence in water and land use related legal matters.

PROFILE OF EXPERIENCE:

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

1. Agricultural engineering.
2. Bulk water transport.
 - 2.1 system design
 - 2.2 canal design
 - 2.3 pipeline design
 - 2.4 reservoir design
3. Management systems development
 - 3.1 CAD systems
 - 3.2 data base management
 - 3.3 GIS
4. Hydraulics.
5. Hydrology.
 - 5.1 flood peak estimation
 - 5.2 mathematical modelling
 - 5.3 risk analysis
 - 5.4 simulation and system analysis
6. Irrigation.
 - 6.1 crop water requirement determination
 - 6.2 farm dam design
 - 6.3 drainage
 - 6.4 system design
7. Legal aspects.
 - 7.1 water law
 - 7.2 expropriation law
 - 7.3 land claims
8. Municipal engineering.
 - 8.1 infrastructure development
 - 8.2 earth works and foundations
 - 8.3 storm water networks
 - 8.4 sewage networks
 - 8.5 domestic water supply
9. Project management.
10. Structure analysis and design.
11. Water source planning and development.

12. Water utilisation

A list of approximately 1000 projects completed over the past 30 years is available.

SPECIALIST ABILITIES:

VALIDATION, VERIFICATION AND LICENSING OF WATER USE

Presently the firm is commissioned by the Department of Water Affairs and Forestry to conduct the validation and verification of existing lawful water uses in the Upper Vaal, Middle Vaal, Crocodile-Marico and Limpopo Water Managements Areas.

A main focus area of the firm is to compile and submit water use licence applications for development projects countrywide. Recent projects include water use applications for the Highland Gate Golf and Trout Estate near Dullstroom, the Waterfall City Development in the northern suburbs of Johannesburg, Pecanwood Golf Estate at the Hartbeespoort Dam, Ditholo Development near Bela Bela and the Lidleyspoort Rametsi Lodge development. Numerous smaller developments within the Brits and Hartbeespoort areas have also been licensed through our application efforts.

The professional team of the firm has got vast experience and intimate knowledge regarding water use and water legislation. Some members of the team are retired senior officials from the Department of Water Affairs and Forestry, who were actively involved in the development of the National Water Act and also in the implementation of policies and regulations emanating from this act.

The firm is capable of handling any water use licence application in a professional and diligent way.

SURVEYS FOR THE DETERMINATION OF WATER USE ENTITLEMENTS IN TERMS OF THE NATIONAL WATER ACT

Schoeman and Partners is able to determine through field surveys and desktop studies the nature of water usage inside and outside of previous 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 use entitlements, management aspects and liaison with water users.

During the survey process title deeds area thoroughly investigated. The title deed information of each property is obtained and checked through computer modem 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 and satellite images. 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.

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

With A0 and A3 colour plotters and a A4 colour printer, a report is completed with relevant maps, graphs and lists according to the needs of the client.

Specific data base 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. : licence applications, validation of existing lawful water uses and applications for the verification of existing lawful water uses.

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. *Arc Info* and *Regis*.

The knowledge and experience exist to analyse the available data according to the National Water Act. During this procedure, hydrological analyses are done to determine the flow regimes in the particular water resource(-s). Because of the involvement of the firm's expert witness in several water court cases, water rights 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, the senior partner in the firm Mr H. N. Schoeman 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 National Water Act was based.

AERIAL VIDEO IMAGE CAPTURING (AVIC)

Early in 1993 the need for cost effective and quick remote sensing was recognised. An investigation of existing methods of remote sensing (e.g. aerial photography and satellite imagery) showed that no satisfactory method existed to complete assignments within the project budget. A unique method was the developed. AVIC was the answer to the problem. The process had to be developed from scratch as no local knowledge or experience existed in this field.

AVIC in short comprises the accumulation of data with the aid of a video camera and is not in direct competition with standard aerial photography or satellite imagery. It is a quick and cost effective method to supplement existing data and technology. In the absence of sufficient existing information AVIC is an excellent basis for further studies or an ideal instrument to supply outline information on a particular area.

Attractive properties of AVIC are:

- The end product is in full colour and continuous, can be frozen on screen, rewound or forwarded at any time, without using expensive or complicated equipment. Only a standard VHS or Beta video machine and PAL television set are needed for playback.
- Because the video is in full colour, more detail and attributes can be identified than on a greyscale aerial photograph. The true colour image need not be interpreted as is the case with false colour satellite imagery.
- Weather permitting, the turn around time of the project is short and a final product can be supplied very rapidly.

As AVIC gives a continuous image, and the photography is flexible, the number of possible applications is numerous, e.g.:

- Damage estimations after natural disasters like hail storms, floods and veld fires.
- Monitoring of expansion of urban border areas.
- Determination of the ecological state of eco-systems, e.g. rivers and forests.
- Progress on construction sites, e.g. building of dams and roads.
- Updating of existing information without total re-investigation.

Since the beginning of 1994 the firm works closely together with the CSIR in developing new methods and refining existing procedures concerning AVIC. Although development and refining are continuous processes, the scientifically justified methods, knowledge, know how and equipment are vested in the firm to produce a quality product meeting the needs of the client.

The latest development includes time linkage of the GPS (satellite navigation system) to video images and a coordinate data base, in such a way that accurate positioning of video images can be done on the GIS system.

Institutions that have so far made use of our AVIC-services are:

- Department of Water Affairs and Forestry
- Department of Agriculture
- Department of Nature Conservation
- KOBWA.
- Pretoria Regional Services Council

DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEMS

A robust application for the in-field registration of water uses was developed for the Department of Water Affairs and Forestry, 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 DWAF, Transnet, Safcol and a number of consultants employed by DWAF 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 and Paradox.

WURM was further developed to also serve as the data-capturing and reporting front end for the water use management information system that, in conjunction with a GIS implementation, will form the backbone of water use management in several water user associations and water management agencies. 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 is at present being developed for the Magaliesberg Citrus Co-op. In this implementation all spatial and alpha-numerical data of the growers of citrus who are members of the Co-op will be represented in a manner that will facilitate proper planning, management and strategic positioning in the market place.

SPECIFIC EXPERTISE PERTAINING TO WARMS

The Schoeman & Partners / Copad consortium was responsible for the total registration process in the Crocodile-West / Marico WMA, including the capturing and editing of all data on WARMS. Before a WARMS manager was appointed for the North-West region, the project leader of the consortium represented the region on the WARMS Liaison Committee. The office also assisted the region in the determination of the Scheme Management Parameters of the WMA.

The consortium is at present busy with the validation and verification (including data standardisation) of all the registration information in the Upper Vaal WMA.

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.

In-house IT expertise (Databases and GIS): The information at the disposal of the Department is enormous, although not always easily accessible. The only way in which efficient and effective water resource management can be achieved is to give decision makers and officials access to this vast source of information. WARMS is a huge source of management information but is not easily accessible for everyday queries. Schoeman and Partners has developed a fully operational Water Management Information Tool for the Directorate : Water Apportionment 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. During the evaluation of new licence applications or where compulsory licencing is contemplated, the access to correct and up to date information is vital. In the Upper Vaal WMA the consortium is assisting the Department by supplying all the supporting information such as existing permits in the area, current water use(s) and all other data necessary to evaluate the application.

EXPERIENCE IN RURAL COMMUNITY WATER SUPPLY

During 1995 the need for a rural community water supply scheme on the farm Buffelshoek in the Moinooi area was identified. The level of the ground water in the area is dropping continuously and existing boreholes are drying up.

Rand Water allowed a connection to their pipeline which crosses the farm Buffelshoek. The pipeline is used to pump water from the Witwatersrand to the Rustenburg area. The water for the community water supply scheme is distributed through a separate pipeline and water points. 15 households with approximately 150 people are supplied of water by the scheme. The Droëfontein Water Committee administrates the scheme.

PARTNERSHIP WITH EMERGING CONSULTANTS AND BLACK ECONOMIC EMPOWERMENT WITHIN THE FIRM

This firm actively support forming joint ventures with emerging consultants. The firm is currently in partnership, on DWAF projects, with the emerging consultants, Copad Engineers (Johannesburg) and other partnerships, if required, can be formed.

The following affirmative actions are in place in the firm.

- David Mahlangu : Preferential BEE appointment as field survey officer. He is at present being trained in all aspects of our activities, with the purpose of eventual appointment in the management team.
- Peter Machete : Full financial assistance was provided for this employee to study Architecture at the Technikon Pretoria. He is presently employed in a senior position in the Madibeng Municipality.
- Janène Joubert, Elbe Mears and Susan Pretorius :
Women appointed in positions traditionally filled by male employees.
- Frans Mochocho : Full financial assistance was provided for this employee to study Information Technology at the Technikon Pretoria. He is presently employed in a senior position at Cell C.
- Alfred Mojela: BEE appointment as senior GIS operator. Presently being trained in management aspects, with the purpose of eventual appointment in the management team.

FEE STRUCTURE

The proposed fee structure will be as prescribed by the Engineering Profession of South Africa Act.