

SSI grows its African portfolio

SSI Engineers and Environmental Consultants has boosted its African portfolio following the award of a multimillion US Dollar water supply project in Zomba, 70 km north of Blantyre, and Mangochi, 170 km north of Zomba, by the Malawian Southern Region Water Board.

The South African company is working in close cooperation with local subconsultant Chapita Consulting Engineers of Lilongwe. According to project director Mike Richardson of SSI, the project will extend the existing water distribution systems to meet increasing demands in both centres.

In Mangochi the project will also improve the quality of potable water being distributed from its source at the south end of Lake Malawi. Water quality in the lake has deteriorated in recent years and the existing technology is no longer able to provide adequate water treatment.

In Zomba the project will involve upgrading of the existing water treatment plant and a booster pump station as well as the design on extensions to the existing distribution system south along the Kamuzu highway towards Blantyre. The latter includes pipelines, a booster pump station and water tank.

SSI's contract includes a socio-economic survey and review of business plans for both towns, as well as an environmental impact assessment for all the works. "Although the technology we will be specifying for this project is pretty standard, logistics will present a big challenge once construction starts," says Richardson. "We have already solved the communications issue by setting up a local wireless Internet connection at the site office."

Utility injects millions into capital projects

Amatola Water is injecting millions of Rands into capital projects designed to meet anticipated future water demands and to improve water quality in the Buffalo City Municipality and Amathole District Municipality.

These projects, which are already underway, will see several water treatment works being upgraded and additional pipelines being laid to extent the water utility's supply zone to other areas outside its present area of supply. This includes the

upgrading of the Laing water treatment works in King William's Town and the Nahoon water treatment works which supplies water to East London and surrounds to a total of R29-million. These projects were anticipated to be completed by the end of last year.

Amatola Water project manager Ronney Mtshana reports that construction on the required additional pipelines would begin early this year. He says there is also the R11-million upgrading of the Masincedane water treatment works in Keiskammahoek and laying of additional pipelines to meet future water demand. The works' capacity is being increased from 1,8 Ml/day to 4 Ml/day to serve new low-cost housing and other planned developments in the region.

The Peddie water treatment works, which currently supplies water to the town and surrounding villages, is also undergoing a revamp.

Desalination tender for VWS Envig

VWS Envig has been awarded a tender by the Ndlambe Municipality, in the Eastern Cape, to supply a water treatment plant to provide potable water to the communities of Cannon Rocks and Boknes.

The company will be refurbishing the existing plant, which treats salty groundwater through reverse osmosis (RO) membranes. The new plant will have a capacity of 750 m³/day. The company will supply and integrate a seawater RO skid with pre- and post-treatment for the project. The skid is being manufactured by the company's facility in Paarl.

According to Abrie Wessels, VWS Envig General Manager: Western Cape region, commissioning of the project is scheduled for May. "The company will operate and maintain the plant for 14 months and will also provide operation and maintenance training to municipality staff to ensure the plant's long-term viability."

"The main challenge of the project will be ensuring compatibility between the existing and new plant in terms of infrastructure and equipment," reports Wessels. "However, our experience in completing similar jobs gives us a base of expertise that will ensure the success of the projects."

New alliance for better quality water

Nanotechnology is but one of the new generation technologies that will be explored by Johannesburg Water (JW) under its new Memorandum of Understand-

ing (MoU) with the University of Johannesburg (UJ).

The MoU, signed in January, paves the way for the two entities to collaborate on research and development projects in various areas, including nanotechnologies, water purification, wastewater treatment and innovation in water analyses. It is anticipated that this initiative will assist JW to benchmark its performance and thus ensure the enhancement of its efficiencies and competitiveness through research and development. In turn, the UJ will be afforded the opportunity to further develop research-based approaches to long-term strategic planning linked to economic, social and other areas of development.

"We believe that the key to the successful development of new and novel technologies lies in forging science and technology partnerships and the collective will to increase a skilled workforce to enhance competitiveness in future," reported Jones Mnisi, JW Acting CEO. "Such partnerships are particularly critical if we want to improve business efficiencies, reduce the cost of service delivery and become more responsive to the needs of our customers."

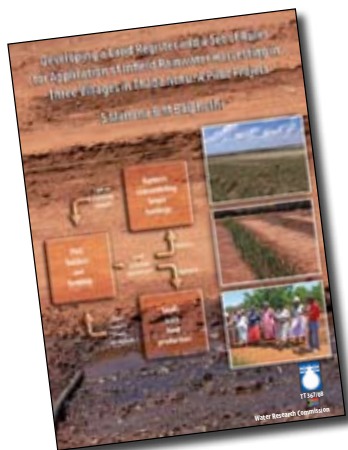
The alliance will also see UJ providing workplace-learning opportunities to JW workers/students and outlines other meaningful interventions that address the shortage of scientists and engineers especially in this service industry. Since JW has accredited water laboratories with state-of-the-art equipment, this presents an opportunity for the training of scientists towards obtaining higher degree at UJ.

While the MoU merely lays the foundation of a relationship between the two organisations, it is important that it is not merely a "paper exercise", said UJ Pro-Vice Chancellor, Prof Derek van der Merwe. He noted that substantial groundwork had already been laid and that he expected hard results by the end of the year.



Johannesburg Water Acting CEO Jones Mnisi and University of Johannesburg Pro-Vice Chancellor Prof Derek van der Merwe toast the new Memorandum of Understanding signed by the two organisations.

New from the WRC



Report No: TT 367/08

Developing a Land Register and a Set of Rules for Application of Infield Rainwater Harvesting in Three Villages in Thaba Nchu: A Pilot Project (S Manona & M Baiphethi)

This project complemented a five-year solicited research projects funded by the WRC in various villages around Thaba Nchu. The investigation revealed the complex nature of land tenure and the total collapse of land administration in the villages concerned, mainly as a result of the lack of a coherent policy and legislative framework since 1994.

Report No: KV 216/08

A Preliminary Exploration of Two Approaches for Documenting 'Mental Models' Held by Stakeholders in the Crocodile Catchment, South Africa (H Biggs; D du Toit; M Etienne; N Jones; A Leitch; T Lynam; S Pollard and S Stone-Jovicich)

Mental models are what people use to understand and interpret phenomena of everyday life. These models are frameworks of concepts and relationships that underpin how people understand, filter and process information and contribute to understanding, reasoning and action. This report reflects an attempt to try understand issues of compliance with the water legislation by eliciting mental models which may underlie much of the intrinsic motivation of stakeholders to take particular collective actions, develop specific practices, and ultimately behave in particular ways.

Report No: 1576/1/08

Real Time Irrigation Advice for Small-Scale Sugarcane Production using a Crop Model (A Singels and M Smith)

The rapid progression of communications technology enables quick transfer of large amounts of data and information, further bolstering the potential usefulness of computerised irrigation decision support systems. In practice, farmers tend to prefer instinct or simple tools over these sophisticated systems. The challenge is to provide simple, practical and useful advice to farmers using state-of-the-art technology and to convince farmers of the benefits of irrigation scheduling. The objectives of this study were to develop and refine an automatic irrigation advice system consisting of automatic weather stations, a Web-based crop model and cellular communication network; implement the system for small-scale farmers and evaluate the suitability of the system for providing useful irrigation advice and to determine likely adoption rates and impacts on water use.

Report No: 989/1/08

The Value of Water as an Economic Resource in the Greater Letaba River Catchment (CJ Williams; GA Veck and MR Bill)

During the past number of years the Water Research Commission has initiated a number of economic research projects aimed at determining the value of water in different sectors of the economy and in different parts of the country. This project explores the value of water as an economic resource in the Groot, Middle and Klein Letaba river catchments, in Limpopo. The need for water is an important issue in every part of the region and the need for effective water management is great. During this study the water balance was determined in the catchment as well as the water demand schedules for the irrigated agriculture, forestry, ecosystems and household sectors. The study used these demand schedules to determine the economic value of water by establishing willingness to pay.

Report No: 1319/1/08

Modelling Vegetation Water Use for General Application in Different

Categories of Vegetation (PJ Dye; C Jarman; D le Maitre; CS Everson; M Gush and A Clulow)

Water yield from catchments may be significantly modified by vegetation management. Since the early 1900s, South Africa has witnessed one of the most hydrologically extreme changes in land use to be found anywhere in the world, which has demonstrated how influential land cover is altering the proportions of 'green water' (water evapotranspired from vegetation) and 'blue water' (water in streams). In the higher rainfall areas of the country, for example, there has been a steady conversion of natural grassland and shrublands to forest plantations. A greater need has been expressed for realistic information on vegetation water use, however, to date accurate data have remained unavailable. The aim of this project was to develop a relatively simple framework of understanding of annual evapotranspiration patterns shown by a wide variety of land covers, and to translate this framework into a user-friendly form permitting predictions of vegetation evapotranspiration by non-researchers.

Report No: 1525/1/08

Assessments and Improvement of Filter Media Cleanliness in Rapid Gravity Sand Filters (J Haarhoff; SJ van Staden; J Geldenhuys; M Sibiya; P Naicker and N Adam)

Rapid sand filtration is an essential unit process in the water purification process. It captures and removes coagulated and flocculated material and other suspended matter not removed during the preceding treatment processes. The pores in the filter bed gradually become clogged and the media progressively collects deposits through the continuous use and life of the filter. Air scour and wash water are applied to clean the filter media. The combined action of air and water should return the media to its original clean state, however, on inspection it is found that filter sand on purification plants is unacceptably dirty and backwash systems are incapable of cleaning the media to its initial state of cleanliness. Often the reasons for the media deterioration remain elusive and the media becomes dirtier the longer it is used. As there was an almost complete

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lack of published or agreed upon procedures to measure the cleanliness of filter media, rudimentary methods for measuring filter media cleanliness and backwash efficiency were developed during this study. Thereafter filter media from full-scale treatment plants were analysed with these methods at regular intervals to establish some benchmarks for these determinants. These methods were also applied during the laboratory and pilot plant phases of the project.

Report No: 1629/1/08

Research into UD/VIDP (Urine Diversion/Ventilated Improved Double Pit) Toilets: Physical and Health-related Characteristics of UD/VIDP Vault Contents (CA Buckley; KM Foxon; N Rodda; CJ Brouckaert; S Mantovanelli; and M Mnguni)

The aims of this project was to provide a scientific basis for the design and operation of urine diversion toilets by eThekweni Municipality; evaluate the effectiveness of these toilets in improving the well-being of the user community and determine the fate of *Ascaris spp.* eggs from urine diversion toilets. The results of the study support the continued rollout of the system. Since the greatest risk of propagating disease centres on emptying a vault and burying its contents, the physical design of the vaults should be looked at critically to make these operations as easy as possible. Drying and biological degradation of the UD waste appear to be chiefly dependent on contact with air, so the design of the toilets should aim for good air circulation through the vaults.

Report No: 1551/1/08

A Preliminary Decision Support System for the Sustainable Design, Operation and Closure of Metalliferous Mine Residue Disposal Facilities (B Rademeyer; JA Wates; N Bezuidenhout; GA Jones; E Rust; S Lorentz; P van Deventer; W Pulles and J Hattingh)

Mining of South Africa's gold, platinum and base metal resources has given rise to hundreds of mine residue disposal facilities of which the footprints cover large areas of land. It is estimated that about 12 000 ha of land is sterilised by 150 gold mine residue disposal facilities within Gauteng alone. Mine residue usually contains sulphide minerals, which upon weathering give rise to a range of potential pollutants. Where there is insufficient neutralising potential in the mine residue, acid mine drainage occurs with its associated low pH values, high salt loads, and high concentrations of metals. The legacy of the impacts associated with

these facilities has given rise to an increasingly complex regulatory regime. Approvals for upgrading old facilities, for development of new facilities, and for closure plans are difficult to obtain owing to the lack of a suitable framework within which to make decisions. It is imperative to develop a coherent process to facilitate transparent and effective regulatory decision making. This research project was intended to be the first of three phases, stretching over five to ten years. The first phase, the preliminary decision-support system, will be followed by a second phase, addressing some of the key knowledge gaps identified during the first phase. The third phase will involve the development of a final decision support system.

Report No: 1420/1/07

Review of the Selection of Acceptable Flood Capacity for Dams in South Africa in the Context of Dam Safety (J Cullis; A Görgens and S Lyons)

This report is intended to be used as a tool to assist the dam safety practitioner in the selection of acceptable flood capacity (AFC) for dams in South Africa. The primary focus of this report is a review of the *SANCOLD Guidelines on Dam Safety in Relation to Floods*, which outlines the currently recommended approach for the selection of AFC for dams in South Africa. This review was compiled on the basis of a literature survey, key stakeholder interviews, responses to a questionnaire of dam safety professionals and two workshops of dam safety professionals. Specific areas of the *Guidelines* that are considered include the general approach to dam safety assessment, the classification of dams, and the recommended minimum standards for generalised and site-specific dam safety assessments.

Report No: 1596/1/08

Guidelines for the Selection and Effective Use of Ozone in Water Treatment (R Rajagopaul; NW Mbonga and C Nadan)

The use of ozone as a pre-oxidant for water treatment is gaining momentum in South Africa. However, ozonation is generally associated with high energy costs. The main aim of this project was to develop a simple guideline for the cost-effective use of ozone in water treatment application. The guidelines serve as an ozone checklist for water treatment practitioners faced with the prospect of specifying a suitable oxidant for either the pre-treatment or intermediate stage in the water treatment train.

WATER BY NUMBERS

- 58%** – The estimated percentage of the African population that has access to safe drinking water.
- 15-billion m³** – South Africa's storage capacity which is currently in use, according to the Department of Water Affairs.
- 898 300 Mℓ** – The total storage capacity of all the supply dams serving Cape Town, the largest of which is Theewaterskloof with a capacity of 480 000 Mℓ.
- 25 700 ℓ** – The water required to grow a day's food for a family of four.
- 1 million** – The estimated number of people across southern Africa who have suffered as a result of floods, cyclones and heavy rains during the annual wet season, according to United Nations relief officials.
- 2%** – The percentage of South Africa's water used by the power generation sector.
- 2025** – The year by which Gauteng, KwaZulu-Natal and Limpopo will suffer acute water shortages if no further bulk water infrastructure schemes are implemented, according to Department of Water Affairs & Forestry national water resources infrastructure Deputy Director-General Dr Cornelius Rutgers.
- 97%** – The percentage of residents in the Tshwane Metropolitan Municipality which have access to tap water within 200 m of their homes. The municipality had connected more than 43 000 households by December 2008.
- 38** – The number of years ago that the Ramsar Convention on Wetlands was signed. The disappearance of the wetlands, the need to protect them for their values and benefits were the primary goals that led to the establishment of the convention on 2 February 1971.
- 1 billion** – The number of people around the world whose water supplies are under threat from increasing populations, expanding cities, industrialisation, climate change and the rising demand for food, according to the United Nations.
- 9 billion** – The estimated number of people there will be in the world by 2050, increasing competition for scarce water resources.