

Ninham Shand

inherits Stewart's mantle

IN 1932 WHEN TOM STEWART was contemplating retirement, a young consulting engineer was erecting his brass plate just a few doors away from the doyen's chambers in St Georges Street. This was Ninham Shand, who had graduated from the University of Cape Town with the Gold Medal in 1919 and whose guiding hand would influence the water supply to Cape Town for the next century.

On obtaining his degree Ninham joined the Department of Irrigation and was posted to the construction works for the Kamanassie Dam near Oudtshoorn. This was followed by a year with a contractor, after which he travelled to the United States to widen his experience. There he worked for the US Bureau for Reclamation, the national body responsible for dams and irrigation in that country.

As Cape Town's water resources again became critical after the First World War, the city looked towards the Hottentots-Holland Mountains for its future water needs. Tom Stewart had already tramped the valleys and discovered two or three potential sites, and a Board of Engineers comprising the City Engineer (the well-known David Lloyd-Davies), WA Tait (a Scottish water supply specialist) and

Stewart opted for a dam on the Steenbras River above Gordon's Bay.

The first Steenbras Dam was a masonry structure in the manner of Stewart's Table Mountain dams, and impounded 2,740 megalitres behind an 8 metre high wall. This soon proved inadequate and in 1926 the dam was raised by 13 metres to provide a capacity of 27,240 megalitres. "Raising" was scarcely accurate: the entire old structure was enveloped in a mass concrete structure, which has survived to this day, although the crest of the dam was subsequently raised.

On returning to South Africa in 1926, Ninham Shand spent two years

as Assistant Resident Engineer on this second 'raising' of the Steenbras Dam. He worked under Jack Hawkins, another distinguished water engineer who went on to found the practice known for decades as H2O. Hawkins was an able mentor and he introduced Ninham to the peculiar characteristics of Table Mountain sandstone, which would stand him in good stead on future jobs. At weekends the young engineer would go walking in the mountains, noting rock properties, looking out for dam sites and developing the awesome stamina for which he became noted. When the dam-raising was completed, Ninham was appointed as Resident



1 Site Staff at Steenbras 1926
Ninham Shand is in front second from the right. Jack Hawkins, the founder of the firm HHO is next to him holding a hat.

At the turn of the century Tom Stewart had identified the Wemmershoek valley as a potential dam site, and in fact he had preferred it to Steenbras. It was an obvious site to turn to, and Solly Morris, the recently appointed City Engineer, invited Ninham Shand to join the Board of Engineers to control the project

Engineer on the construction of the new pipeline from Steenbras to Newlands.

Ninham then spent some time in Port Elizabeth where he was Resident Engineer on the raising of the Bulk and Sand River Dams and the construction of the Upper Van Staadens Dam, and where he showed that water could be delivered to the city under gravity from a site some 80 km away on the Kromme River, which in due course led to the construction of the Churchill Dam. Before the Churchill Dam was built Ninham returned to Cape Town and set up as a consulting engineer. Initially he was associated with the Johannesburg practice headed by Geordie Stewart, but in 1947 he became the sole owner of the firm which bears his name.

The fragile state of Cape Town's water supply again became critical after the Second World War, and the authorities once more looked to the Hottentots Holland Mountains to augment the supplies.

First up were improvements to Ninham's old friend the Steenbras Dam, which had the potential for extra storage if the wall could be raised. Ninham was familiar with the innovative prestressing techniques of the celebrated French engineer M Coyne, and together they devised a system of pinning a 2 metre high extension onto the old dam wall, which increased the capacity of the dam by some 60%. This relieved Cape Town's thirst for a few years, but by the mid 1950s signs of a crisis were reappearing.

WEMMERSHOEK DAM

At the turn of the century Tom Stewart had identified the Wemmershoek valley as a potential dam site, and in fact he had preferred it to Steenbras. It was an obvious site to turn to, and Solly Morris, the recently appointed City Engineer, invited Ninham Shand to join the Board

of Engineers to control the project.

In 1952 Ninham had been on one of his busman's holidays to the United States and had paid particular attention to rockfill dams, which were becoming popular technology. Thinking along those lines, he suggested that an old friend and former Head of the United States Bureau of Reclamation, Dr John Lucian Savage, should be the third member of the team, to which Dr Morris readily acceded.

Ninham proposed a rockfill embankment with a clay core and filters. Washed alluvium would be placed using huge water jets to consolidate the dumped rockfill in accordance with practice in the United States at that time. Dr Savage supported Ninham's proposal, and the design was implemented accordingly, saving some half million pounds in foundation costs.

The Wemmershoek Dam and its pipeline were successfully completed in 1958.

During investigations for this dam Ninham realised that a much larger dam site was available on the other side of the watershed, but would require extensive delivery tunnels to bring the water to augment the Cape Town system and to irrigators along the Berg River. In due course this site became the Theewaterskloof Dam, which was built by the Department of Water Affairs and Forestry (DWAF) in the early 1980s and is a vital component of the Western Cape water supply system.

STEENBRAS PUMPED STORAGE SCHEME

After Ninham's death in 1969 his younger colleagues Walter Powrie, Neville Pells

and Robin MacKellar reported to Eskom on the potential for pumped storage in the Western Cape and identified that the Steenbras Dam, perched high on the mountains, would offer possibilities for such a scheme.

At the time Cape Town was beginning to experience shortages in peak electric power, and the City Electrical Engineer, Denis Palser, cast his eye around for efficient solutions. Shands, together with electrical consultants Merz and McLellan, suggested that Cape Town should consider the Steenbras option, and Walter Powrie went overseas to link up with designers of similar schemes in the British Isles. Their report convinced Mr Palser, and the Shands team was appointed to design and implement the project.

The existing Steenbras Dam may well have been used for the upper reservoir, but the structure was not considered suitable for raising to provide the head required by the hydro turbines. Instead the decision was made to construct a separate embankment dam within the reservoir. This upper dam served a dual purpose in that it not only increased the head available for the generating system but it also augmented the total water supply to Cape Town by doubling the effective capacity of the original Steenbras reservoir.

The 30 metre high receiving dam is sited below the power station on the western slopes of the Hottentots Holland

2 Ninham points out a feature of Wemmershoek to Dr John Savage



Mountains near Gordon's Bay and is also an embankment dam.

This was a landmark project for both Shands and the City of Cape Town, whose R60 million investment was to prove an extremely good one by creating significant savings in the cost of power purchases from Eskom, as well as providing additional capacity for water supply to the ever-thirsty city.

With the usefulness of the pumped storage principle having been established through the Steenbras Scheme, Eskom in conjunction with DWAF took the matter further and constructed the 1 000 MW Drakensberg Pumped Storage Scheme. This was followed by the Palmiet Pumped Storage Scheme, adjacent to Steenbras, where the firms of Ninham Shand, VKE and Electrowatt formed the SVE consortium to undertake the design and contract administration of the project.

BERG WATER PROJECT

When Ninham passed away prematurely in 1969, his son Mike joined the firm and in due course became a nationally re-

spected water engineer. One of his most significant achievements was to lead the team which compiled the Western Cape System Analysis of 1992, highlighting the state of local water resources – Cape Town's water resources were once again in a precarious situation.

This eventually led to the implementation of the Berg Water Project where Shands joined forces with Goba and Knight Piesold to form the Berg River Consultants to win the design and supervision contract for the scheme, which has a gross storage capacity of 130 million cubic metres.

It is quite remarkable that one man could have had such an influence on the water supply of a city. Ninham Shand accepted the challenge to continue where Tom Stewart had left off, and he and his colleagues have served Cape Town with great distinction. Their work is not yet complete, as Cape Town seeks to exploit new sources of water in the 21st century.

This article is based on the book "Ninham Shand – the Man and the Practice", edited by Tony Murray, which is due to appear early in 2009

When Ninham passed away prematurely in 1969, his son Mike joined the firm and in due course became a nationally respected water engineer. One of his most significant achievements was to lead the team which compiled the Western Cape System Analysis of 1992, highlighting the state of local water resources – Cape Town's water resources were once again in a precarious situation

Source:

http://www.saice.org.za/downloads/monthly_publications/2008/CivilOct2008/#/0