



Paving the way

In March last year, Cape Retaining Systems, a Cape-based retaining block manufacturer and Terraforce licence holder, was approached by Requad Construction to reclaim more habitable surface area for building low-cost homes near Kayamandi, an informal settlement in the vicinity of Stellenbosch.

After some consideration, Terraforce retaining blocks were decided on, as they provide a cost-effective, yet durable method for creating platforms and road/sidewalk support on the old farmland, which is earmarked to provide 380 emergency homes to families that are currently living on what will eventually become the parking area for the upgraded Kayamandi sports field and tourism centre.

Says Henk van Renssen, project engineer with Arcus Gibb, the engineering and science consulting company involved in the project: "The site, called Temporary Relocation Area 2 (TRA2), forms part of the bigger Watergang Housing Project and will soon be home to 380 families that need to be relocated, so that urban upgrading can take place in the area.

"The homes, which now consist of basic wooden structures, will eventually give way to 100 permanent homes. The goal is to provide more formal housing in the long run, while improving the general environs."

The retaining blocks used at the Kayamandi site were pioneered by Terraforce – a Cape Town based pre-cast concrete licensor – 30 years ago, and represent one of the most energy-efficient segmental retaining wall systems.

Says Jeremy Leighton of Cape Retaining Systems: "What makes this product so popular in the industry is that the blocks require low hardware input for manufacture, low

transport costs and low inventory requirements at sales outlets. They are hollow, yet strong enough, and require less concrete to do the job when compared to solid block systems, which of course saves money."

The first concrete foundations were laid in November last year.

Each of the three walls is fitted with a 110mm subsoil drainage pipe that runs along the entire length of the wall and exits through weep holes cut into individual blocks at regular intervals. As the walls were built up, a sand drainage layer of 500mm was filled to the top to prevent possible damming-up of water.

A similar project using Terraforce blocks was initiated by the Ministry of Urban Development of Swaziland to provide urban up-grading in the suburbs around Mbabane, where steeply sloping and easily erodible topography in a high rainfall area posed challenges to the local town planners.

To prevent further serious damage to the environment, remedial measures were carried out, using manual labour as much as possible.

According to Michael Toepfer, owner of Milito Precast, Terraforce products provided cost-effective, environmentally sound solutions, as well as job opportunities: "The blocks are manageable enough to use manual labour to install, and many unemployed locals managed to find work during the construction period. Because a number of smaller walls were built, no heavy machinery was required and the locals, armed with a shovel and pick, were able to lay the blocks themselves. The workforce came directly out of the informal settlements, and was monitored and trained by recommended contractors and supervisors." ■



Engineering and environmental consultant SSI (part of the Braamhoek Consultants Joint Venture) is currently overseeing one of Eskom's major power generation projects. Due for final completion towards the end of 2013, the Ingula Pumped Storage Scheme is set to contribute power to the national grid during peak hours, SSI's senior branding manager, Robin Hayes, tells Laura Cornish.



Construction in progress at Braamhoek.

Engulfing Ingula

The Ingula Pumped Storage Scheme is situated in the Little Drakensberg mountain range just outside of Ladysmith in KwaZulu-Natal. The design and construction supervision make it a highly esteemed notch on SSI's project belt.

Referred to as a 'peaking power station', Hayes explains that the power station's rated generation capacity of the scheme is nominally 1332MW, with an energy storage capacity of 21 000MWh.

The intention is to produce 1332MW of power during the morning and evening peak hours. "The concept is not unique, and is used to supplement conventional generation capacity across the world," Hayes notes.

The Ingula project will be the third peaking power station in SA, which already includes the Palmiet power station towards Sir Lowry's Pass and the Drakensberg station near Bergville, also in the Drakensberg Mountains.

THE PRINCIPLE BEHIND THE TECHNOLOGY:

The project consists of two major reservoirs and a powerhouse situated 350m below the surface, in the mountain. The upper concrete-faced rockfill dam (CFRD) (Bedford, with a 810m crest length and a 49m height) is situated on the mountain top, and feeds water through the powerhouse, which generates the power.

The powerhouse complex consists of a combined machine and valve hall, a transformer hall and other ancillary tunnels and caverns. The machine hall houses four reversible pump/turbines, coupled directly to generator/motors, each with a rated output of 333MW. The rated generating head is 441m. The water then passes a further 2500m to reach the lower reservoir (Bramhoek) at the bottom of the hill.

The crest length of the lower roller compacted concrete (RCC) dam is 310m and it has a maximum height of 38.6m.



During off-peak hours, thanks to the incorporation of reversible turbines, the water is pumped back up the mountain from the Bramhoek reservoir to the upper Bedford reservoir. The principle behind the design is that kinetic energy is converted into potential energy.

This R20bn project was started in 2004. Commissioning of the first unit is envisaged in early 2013, thereafter commissioning will take place at three-monthly intervals for each subsequent unit, with commissioning of the final unit happening towards the end of 2013.

SSI forms part of the Braamhoek Consultants Joint Venture, which was tasked by Eskom to undertake preliminary feasibility studies, preliminary design, final design and, lastly, site supervision.

"Ingula is a net user of electricity, and its sole purpose is to provide electricity during peak hours when it is needed the most," Hayes reiterates.

The ancillary work alone is a major component of the entire project, which includes power lines, water treatment works, roads, etc. ■

Underground work at Ingula.

Braamhoek Consultants Joint Venture – SSI, Arcus Gibb and Knight Piesold;

- Underground construction
- CMC/Impregilo Consortium: Bedford and Bramhoek Dams
- Braamhoek Dams Joint Venture
- WBHO, Concor, Edwin Construction and Silver Rock Construction.

