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Aerial view showing the dairy and cow handling facility in the background (green roof), and sludge and wash water ponds in the foreground.

# Milking water-wise opportunities

The Wittekleibosch dairy is an inspiring example of what can be achieved by positive government intervention and sound collaboration with the private sector.

By Kim Kemp

**T**he Wittekleibosch Dairy Trust's new milking facility in the Tsitsikamma region of the Eastern Cape is not just a milestone land restitution project; it is also applying some 'water-wise' thinking that will save 30 000 litres of water a day.

The Wittekleibosch Development Trust represents 152 families from the AmaMfengu tribe who were forcibly

removed from the area between 1977 and 1978.

Following the fall of apartheid, the land was returned to the families in terms of the Land Claims Restitution Act. Now, with funding from the province's Department of Rural Development and Agrarian Reform (DRDAR), the Trust is joint-venturing with commercial partner Johan du

Plessis to construct and run this R30-million rotary dairy.

The new 66-point rotary milking platform, capable of milking 1 200 cows twice a day, has come not a moment too soon to replace the Trust's one ageing milking parlour. With a combined capacity for just 600 cows, these facilities were no longer keeping up with demand. Once the



Sludge and wash water ponds prior to commissioning. Note rehabilitated slopes and embankments.

new dairy reaches full production, its output will expand to over six million litres of milk a year, which will be sold to dairy giant Parmalat.

Contracted to manage the construction of the new project, SRK Consulting (South Africa) is ensuring that it is not just technically top-class but also environmentally responsible. Health, hygiene, and cleanliness are clearly items at the top of any dairy's list of success factors, and plenty of water is usually necessary to keep such a facility spotless.

"The dairy uses about 50m<sup>3</sup> of water daily from a nearby borehole to clean milking equipment and the concrete hardstand," says Marinus Meiring, associate partner at SRK Consulting. According to Meiring, various water reticulation systems are in place enabling the dairy to be cleaned twice a day – after each milking cycle. "Wastewater from

this activity is normally stored in a large earth pond and allowed to evaporate. However, our groundbreaking innovation allows the dairy to save 30 000 litres of water a day by re-using effluent to clean the external concrete areas around the dairy."

This, says Meiring, is achieved by piping wastewater from the dairy's washing operations to a series of primary and secondary ponds. These ponds function anaerobically to allow the settlement and digestion of organic material while clear effluent (without solids) will overflow to the wash water pond for reuse.

"An integrated pipe network allows solids to settle before the water flows to the wash water pond," he says. "The system will probably only need maintenance after about 15 years, after which a partial de-commissioning will be required to undertake maintenance."

The wastewater pond system will also prevent environmental hazards, and a cut-off drain has been installed to prevent groundwater contamination.

"Although there is no requirement to design and construct the milking parlour in accordance with quality standards SANS 204 and SANS 10400," he points out, "the principles of energy-efficient design will be applied to all building services – in case of changes to future compliance requirements."

Extensive mechanical and electrical services are required to ensure a fully functional dairy, as a large range of equipment including compressors, a vacuum pump, heat exchangers and heat pumps, hot water storage, and chillers are required. Various pumps outside the building have been installed to ensure water – domestic, chilled, and recycled – is available across the facility. SRK appointed CA



Secondary sludge pond with vehicle access and distribution manholes.

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du Toit Eastern Cape as a specialist sub-consultant to design and implement these mechanical, electrical, and electronic aspects of the project.

SRK's role included the design and development of the dairy, taking responsibility for the detailed design, tender documentation, and adjudication, as well as construction monitoring and contract administration. SRK has also undertaken the necessary environmental assessments and submitted applications to comply with the National Environmental Management: Waste Act and environmental impact assessment (EIA) regulations made under the National Environmental Management Act.

"The project components range from standard engineering works (civil, structural, mechanical, and electrical) to installing advanced electronics and software to identify and monitor individual cow well-being and milk production rates – making this project fairly unique," Meiring comments. This advanced technology uses the data it collects to automatically sort the cows into the respective enclosures on the concrete hardstand for further investigation and treatment.

Known as the AfiMilk herd management system, this technology was supplied and installed by the specialist mechanical sub-contractor, Waikato South Africa, who was responsible for the supply, installation, and commissioning of the integrated milking system.

Included in the electrical component of the project are various small power systems that serve the mechanical works; there is also a 150kVA emergency diesel

generator capable of powering the dairy for almost 24 hours. “This is vital to keep the facility operational as well as keep milk cool before collection,” he adds. “Various green technologies have been included to ensure that the dairy’s energy needs are met as efficiently as possible.”

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Marinus Meiring – SRK Consulting

The dairy’s holding area for the cows – for before and after milking – consists of a concrete surface 32m wide and 50m long. This hardstand is divided into enclosures, including a cow handling facility with various ‘crushes’ where cows stand in single file to be either artificially inseminated or treated by the herd veterinarian.

There is an additional crush for calves, to consolidate the handling of the herd into one facility. Further provision has been made for neck-clamps, a spray race and a loading ramp for transport purposes. Some 4 000m<sup>3</sup> of bulk excavation, 700m<sup>3</sup> of concrete works, and nearly 800m<sup>2</sup> of brickwork has gone into the civil engineering and building works.

Commissioning of the dairy commenced on 20 June 2017, where the new users introduced their cows to the facility and a 28-day trial period of milking was undertaken. During this time, staff were trained in all the facility’s systems and activities. The project was completed at the end of July 2017. ◆

## Project Team:

- **Employer:** The Eastern Cape Department of Rural Development and Agrarian Reform
- **Beneficiary:** Wittekleibosch Dairy Trust
- **Principal Agent:** SRK Consulting
- **Civil / Structural Engineers:** SRK Consulting
- **Mechanical, Electrical and Electronic Engineers:** CA du Toit Eastern Cape
- **Principal Contractor:** SP Excel
- **Mechanical Sub-contractors:** Northfield Engineering  
Waikato South Africa
- **Electrical Sub-contractor:** WattsUp Electrical



Cow handling facility with the ponds in the background (under construction).



Primary sludge pond prior to commissioning showing vehicle access.



Wash water pond with recycling pump station.