

Innovative water supply solutions for the Greater Hermanus Area

BACKGROUND

The catchment area of the De Bos Dam, which is the main water source for the Greater Hermanus Area, has experienced one of its most severe droughts in recent history, during a period stretching from September 2010 to April 2012. The dam content had dropped to below 20% of its full supply capacity by April 2012.

The Greater Hermanus Area consists mainly of coastal towns, which have become famous as holiday destinations, resulting in major growth due to population infiltration, which peaks during the April and year-end school holiday periods. These periods respectively coincide with the middle and end of the dry season of the water supply catchment area.

Preekstoel Water Treatment Works, which is located west of Hermanus, near the Hemel and Aarde valley, was originally constructed in 1974, with a capacity of approximately 14 Mℓ/d. It was designed specifically to treat surface water from the De Bos Dam. In 1988 it was upgraded by replicating the original sedimentation

tanks and filters in a mirror-type configuration, thereby doubling the capacity to 28 Mℓ/day. The original filters were also refurbished at the turn of the millennium.

The Overstrand Municipality has realised that this supply and treatment system will be insufficient to cater for future demand growth, especially in view of the drought recently experienced.

THE SOLUTION

The municipality has engaged in the development of a series of groundwater well fields, with the intention of supplementing the surface water sourced from the De Bos Dam. However, the groundwater is rich in iron and manganese, which must be removed to prevent problems ranging from aesthetics and staining, to clogging of the distribution network with gelatinous bacteria that use iron and manganese in their metabolism. The existing treatment works is not able to remove the iron and manganese, and hence specific treatment of the groundwater is required. An add-on dosing

system was provided around 2007 to deal with water from the first well field at Gateway, but with the expansion of the groundwater scheme, it became necessary for the treatment of the various well fields to be integrated and a tailored process to be designed, to ensure reliable achievement of target water quality. This is particularly necessary as the groundwater will in future make up a substantial portion of the total quantity treated at the Preekstoel Water Treatment Works.

To cater for the growing demand of the Greater Hermanus Area, especially during peak holiday periods, a new project was implemented to increase the water supply and treatment capacity until 2020 and beyond.

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Pilot plant for the biological treatment of iron and manganese in groundwater



New backwash and sludge waste pumps have been installed



Refurbished blower and compressor room



Refurbished filters with settling tanks in the back

PROJECT DESCRIPTION

The project comprises the following main aspects:

- Refurbishment of the existing treatment works infrastructure, parts of which are now 38 years old, to enable delivery in line with its full original design capacity.
- Provision of power supply and equipment for the various boreholes, as well as the strategic management of the groundwater supply system to ensure the sustainability thereof.
- Conveyance of groundwater supplies from various sources to a dedicated centralised treatment works located adjacent to the existing Preekstoel Water Treatment Works.
- Construction and implementation of a new treatment works, which has been specifically designed to treat water from the iron- and manganese-rich groundwater sources.

PROBLEMS ENCOUNTERED AND INNOVATIONS

Small sections of the existing works were decommissioned, refurbished and re-commissioned at a time to minimise disruption of the water supply and treatment system. Construction activities were also programmed to ensure that the full works was operational during the peak holiday periods. Although water restrictions were put in place during the drought period, no water supply cut-offs were required for construction purposes during any stage of the refurbishment period.

Most of the borehole wells are located on private properties, some of which are being used for organic farming. A large

portion of the borehole construction area is also very sensitive, not only from an environmental, but also from a social point of view. Borehole structures were therefore designed to blend in with the environment, taking the specific requirements of the property owners into consideration. Vast sections of power supply lines had to be installed below ground level to reduce visual impact.

Removal of the iron and manganese is usually achieved by chemically oxidising the elements to their insoluble form so that they precipitate and can be separated from the water by settling and filtration. This process is, however, expensive, both from a capital and operational point of view. An alternative process that offers distinct advantages is biological treatment of the iron and manganese. This process is not well known and, apart from a pilot study by Umgeni Water funded by the Water Research Commission, has not been used in South Africa before. It has, however, been used successfully in France, Germany, Belgium, Bulgaria, Finland, The Netherlands, Argentina, and elsewhere.

A pilot plant was erected at Kleinmond to familiarise operations staff with the operational difficulties and requirements. After an initial trial period this plant has consistently delivered treated water that complies with the SANS 241 limits. The biological process was therefore proposed for the treatment of the iron and manganese from the boreholes in the Hermanus area.

PROJECT STATUS

The installation of the electrical power supply cables to the various boreholes and works has been completed by ESKOM.

All borehole wells have been drilled and lined. Centrifugal borehole pumps were ordered in July 2012 and are due to be installed by November 2012. Except for a section of pipeline on Camphill Farm, the borehole supply pipeline network has also been completed.

The refurbishment of the existing treatment works has been completed and most facilities have been re-commissioned. The civil and structural construction work of the new biological treatment plant is due for completion by December 2012 and the works is due to be commissioned in March 2013. ■

PROJECT TEAM

Implementing institution	Overstrand Municipality
Co-funding agent	Regional Bulk Infrastructure Grant channelled through the Department of Water Affairs
Designers, Project Managers and Geotechnical Consultants	Aurecon
Geohydrological Consultants	SRK and Umvoto
Environmental Consultants	SRK
Main Contractors	Inyanga Projects, Inenzo Water and PCI
Health and Safety Agents	Smartsafe and Aspirata
Environmental Control Officer	Ecosense

The biological treatment plant (a first for South Africa) under construction in Hermanus



Source:

http://www.saice.org.za/downloads/monthly_publications/2012/2012-Civil-Engineering-October/#/0