

New desalination plant to keep 'Diamond of the West Coast' shining



Much has been done during the project to keep the Lamberts Bay coastline as undisturbed as possible.

Veolia

Lamberts Bay, on the West Coast, has become the latest in a steadily growing number of South African towns opting to augment their conventional water supply through seawater desalination.

Lani van Vuuren reports.

Situated some 280 km north of Cape Town, Lamberts Bay, nicknamed the 'diamond of the West Coast', has developed from a small fishing village into a popular holiday town. The town has a population of around 40 000, which swells significantly during the peak holiday season. Lamberts Bay falls under the Cederberg Municipality.

Lamberts Bay has traditionally obtained its water from groundwater sources, with six production boreholes located 15 km south of the town. A reconciliation study published by the Department of Water Affairs (DWA) in 2011 revealed that

the town is abstracting significantly more from the boreholes than what is sustainable, causing water levels to decline at an 'alarming rate'.

The DWA study also indicated that seasonal quality variation is apparent, with worsening of the water quality occurring in the summer months when there is little recharge. This has caused the primary coastal aquifer, Lower Wadrif well-field, to become under risk of seawater intrusion from exploitation of groundwater in this area.

DESALINATION PLANT

Following the evaluation of various options (including the drilling of additional boreholes and the construction of a pipeline from Clanwilliam Dam) Cederberg Municipality made the decision to augment Lamberts Bay's water supply through the addition of a seawater desalination plant. Veolia

Water Solutions & Technologies South Africa was awarded the multimillion Rand contract in 2012 to provide the plant, which uses reverse osmosis (RO) technology to treat the seawater to potable standard.

The plant has been located next to the existing Lamberts Bay water treatment works, about 800 m from the coast (so as to have the lowest possible visual impact on the coastline). The close location to existing infrastructure also allows easier tie-in of the desalination plant to the Lamberts Bay distribution network. While the plant will have an initial capacity of 1.7 Mℓ/day, the infrastructure has been so designed to allow capacity increase up to 5 Mℓ/day in future.

Abrie Wessels, Veolia Regional General Manager: Cape, explains how the plant will operate "Seawater is sourced from beach wells located 3 km southwest from the plant site. This will provide a relatively clean

source of feed water to the pre-treatment phase.” Where the pipeline has disturbed the natural vegetation, rehabilitation has been undertaken.

Pre-treatment will comprise shock chlorination of the feed pipeline, coagulation, filtration by down-flow dual-media filters, anti-scalant addition and cartridge filtration. The pre-treatment process removes particles and organic material in preparation for treatment by RO membranes.

During the RO phase, the salt water is forced through semi-permeable membranes, which retain salts and other impurities, allowing freshwater to permeate. Once desalinated, the water will be stabilised with limestone and carbon dioxide, and fed into the town’s existing freshwater network.

The plant layout is based on the initial provision of 2 RO modules, each with a capacity of 850 m³/day. Veolia’s manufacturing division in Spain supplied the plant’s standard compact seawater desalination skids.

SAVING ENERGY

Desalination is an inherently energy-intensive process compared to conventional water treatment. To reduce energy use the Lamberts Bay plant has been

equipped with energy recovery pressure exchangers to recover the residual energy of the brine stream. This energy will be used in conjunction with a booster pump to boost a portion of the feed pressure to the membranes.

Wessels further explains that the backwash water from the dual-media filters and limestone filters will be collected separately, the solids removed and the sludge discharged to municipal drying beds. “This upgrades the quality of the wastewater (brine) produced by the plant.”

“For the brine outfall, marine mapping was undertaken, divers sent into the ocean and sandy areas of lowest impact identified,” explains Wessels. “The brine outfall goes out into the ocean at 150 m, and monitoring of the effect of the brine will be undertaken once the plant is fully operational.”

CLOSE TO COMPLETION

Construction of the desalination plant has been completed, with cold commissioning having been concluded in November 2013. At the time of writing, the construction of the brine return pipeline was being finalised to enable final commissioning to take place. The plant is

expected to come online during the second quarter of 2014.

Interestingly, the Lambert’s Bay contract follows the success of six other desalination plants installed by Veolia along the Cape coastline since 2009 (Cannon Rocks, Bushman’s River Mouth, Knysna, Plettenberg Bay, Mossel Bay and Saldanha), with a combined desalination capacity of approximately 25 million litres per day.

Wessels sees a promising future for desalination going forward. “Desalination – both of seawater and brackish water – will have a blossoming period in the next few years, with the increased demand on limited water resources, together with the increased contamination load of freshwater resources with industrial pollutants and municipal waste. Membranes used for desalination promises a clean water source, both for industrial and municipal applications, with a reliable quality.

“With capital costs and operating expenses of desalination plants becoming more economical, and the increases in penalties for wastewater discharge and the increases in municipal water costs, desalination is becoming an increasingly attractive option for generating additional water supply.” □

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The new Lamberts Bay seawater desalination plant.

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