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Mapping water reuse strategies

The demand for water and the need to assess and manage this precious resource carefully is now an absolute priority. **By Alastair Currie**

WATER ENGINEERING has always been a key focus for Knight Piésold Consulting since its inception in 1921 – an area of expertise which runs in parallel with many other multidisciplinary fields that have evolved within the group over the past 96 years. These often complement or interconnect at some point and include dams, hydro-electric schemes, mining, roads and transportation, environmental services, geotechnical engineering, pipelines and pump stations.

Knight Piésold is one of the few wholly owned South African consulting engineering firms operating worldwide.

Water resources

One of Knight Piésold's water specialisations is catchment management and hydrological modelling, which provide excellent tools for determining the health of ecosystems plus resource management planning. Population growth projections also have a major influence on catchment analysis and future water infrastructure scenarios.

The Department of Water and Sanitation quantifies the assured yield and availability for each catchment region in South Africa (including rainfall and return flows). "If a town, an industry or a mine needs to plan for expansion and future water requirements, we can take a set section out of the catchment data and do the calculation."

Return flows

In addition to Knight Piésold's expertise in hydrology, it is a leader in the design and construction monitoring of wastewater treatment plants either for new works or additions to current facilities. Current examples

include capacity extensions and technological upgrades to various large-scale treatment works operated by Johannesburg Water.

"Since the theme for this year's United Nations World Water Day in March is wastewater, we'd like to comment on our extensive experience in this area, as well as the topic of reuse, which has both direct and indirect environmental impacts," says Sakkie van der Westhuizen, section manager: Power & Water.

Return flow studies are a good starting point. In the Johannesburg area, for example, an estimated 20% to 30% of potable water is indirectly recycled from treated sources that were released back into river systems. Examples here include mines (underground dewatering), general industry and sewage treatment works. The primary concern is to ensure that returned water is effectively treated to acceptable standards so that potentially harmful nutrients, like phosphates and nitrates, are removed beforehand. Some treatment processes remove a very high percentage of these nutrients but others are less effective. Therefore, these return flows have to be closely monitored to assess potential downstream impacts.

Reuse trends

There are various examples where municipalities have begun using treated wastewater for reuse applications such as the watering of golf courses. In fact, back in the 1970s, Welkom was one of the pioneers in this field with the establishment of separate distribution systems for potable and treated water.

The City of Windhoek in Namibia remains the prime example where a municipality has taken treated wastewater to the other extreme, converting it back into potable water.

"The use of treated wastewater at Kelvin Power Station in Johannesburg is a good example of a municipality successfully adopting the reuse model."



Sakkie van der Westhuizen, section manager: Power & Water at Knight Piésold

"Of course, the direct reuse process requires expert control and I believe it should be considered as a last resort. Desalination could be one approach, whether for inland or coastal areas," says Van der Westhuizen. "The recommendation would rather be to target direct reuse for industrial and mining applications, which will take the pressure off available potable supply. The use of treated wastewater at Kelvin Power Station in Johannesburg is a good example of a municipality successfully adopting the reuse model."

The emphasis across the board is on water conservation, and this is not a new phenomenon. Cities like Durban that are presently faced with severe water restrictions have been through this before. For example, in 1982 Durban experienced a particularly severe drought and the decision was made by the municipality to limit monthly household consumption to 8 kℓ. "This immediately instilled a culture of reuse using grey water, a culture that needs to become part of South Africa's daily life." **35**