

# The state of WWTW in SA

Are South Africa's wastewater treatment capabilities a problem? In short, the simple answer is: Yes, very definitely! So, what can be done about it? by Chris Hegley, GIBB

**T**HERE ARE IN excess of 850 wastewater treatment plants (WWTP) in South Africa, ranging from small packaged units serving a limited number of stands right through to some of the largest and most technically advanced sites serving the metros and secondary cities. Recently, there have been a number of surveys and studies by organisations, including the DWA and WISA, which have concluded that a significant number of these works are not functioning correctly. Some sources put this as high as 80% of the entire stock, although it is comforting to hear that the largest plants, which have the greatest potential for environmental impact, are not included in this estimate.

The reasons for this alarming situation are many and varied and certainly, in most cases, not unique to South Africa. Population growth and increasing water demand results in WWTPs that are hydraulically and/or biologically overloaded. Historic under-investment, inadequate capital, operational and maintenance budgets and funding, plus a lack of capacity within municipalities, all result in a



significant burden on the environment.

The current position is unsustainable and if allowed to continue will eventually affect the potential for economic growth within the country. Apart from the obvious damage to the environment and in certain cases, human health, there is also the impact on South Africa's scarce water resources. Surveys indicate that currently, 98% of the current water

**ABOVE** One of our older WWTWs in South Africa that so typically represents an ageing plant and which is run on a shoestring budget

resources are already allocated which leaves little freeboard. But resource availability is not just about volume and accessibility; it's also about quality. If the WWTP continue to pollute the very sources that are used for extracting



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raw water for treatment, that freeboard will be under even more pressure.

Failing treatment plants must be tackled and in most cases should involve a greater engagement between the public and private sectors. Forming alliances between the two will harness the technical and commercial skills of the private sector with the institutional knowledge of the public sector to the benefit of all parties, not least the general public.

Tighter regulation is also a tool that can be used to drive improvements and the recent Green Drop/Blue Drop initiative by DWA is a welcome step in the right direction. However, to be effective the initiative must be fully resourced, and effectively and rigorously implemented.

Technology plays an important part and we should look more closely at the opportunities for recycling wastewater while recognising that there will be cultural, physical and financial implications. Polished wastewater effluent can be used for a variety of applications, from irrigation through grey-water applications and finally to potable use. GIBB is currently engaged in a project in Botswana that will produce potable-quality water from treated effluent, so reducing the demand on the public systems. There are also many opportunities to supply industry with high-quality treated effluent for commercial purposes where potable quality water is not required. An example of this application is the mining industry where the vast majority of water is used in industrial application rather than potable use.

However, wastewater treatment cannot be looked at in isolation. The water cycle has



to be viewed in a holistic way from source to tap and from drain to river. Tackling leakage, revenue collection, infiltration, wastewater treatment, etc., in a structured approach through a robust asset management system is key to meeting the growing challenge that is already upon us. **35**

**ABOVE** Pollution of our rivers is a real and serious biological problem  
**BELOW** Chris Hegley



### WHAT THE GREEN DROP REPORT SAYS

The long-awaited Green Drop Report officially released by Water Affairs minister, Buyelwa Sonjica, recently painted a rather dismal picture of South Africa's sewage plants. Among its findings is that 'the bulk of the plants can be described as poor to non-functional.'

According to the report, only 449 of the 852 wastewater treatment works (WWTW) were actually evaluated. The balance of 403 (47%) are reportedly in such a poor state they could not be assessed. The assessors stated that these WWTW 'were not sufficiently confident in their levels of competence to be subjected to assessments'

Of the 449 that were assessed, only 203 scored 'better than 50 % in measurement against the stringent criteria set'. A scant 32 treatment plants, about 3.8 % of the total, received Green Drop status, which is broadly equivalent to them complying with international standards.

The majority of the plants that won the award are located in or around Cape Town, Durban, Johannesburg and Pretoria.

The report implies that millions of litres of untreated or inadequately treated sewage is being illegally discharged into rivers and streams each day, mainly by small town municipalities.

For those in the know, this is a biological disaster and a danger to human health.



EKURHULENI

## New rail hub in Ekurhuleni

To build a mainline railway station while keeping the trains running on schedule is every engineer's challenge, especially when 3 500 V overhead power lines are involved.

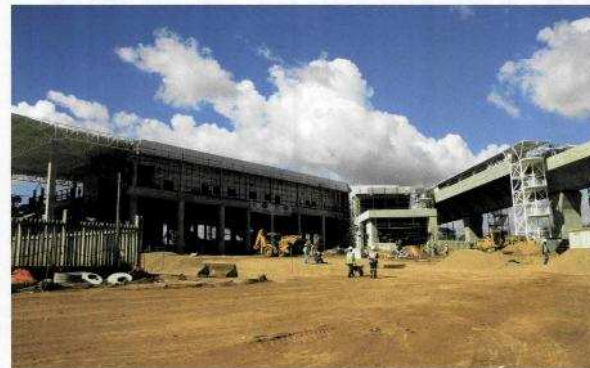
by Tony Stone, Wimpie Oosthuizen, Pr Eng (Gibb), and Gerald Loe, Pr Eng (Rainbow Construction)

**A** LITTLE OVER 12 months ago GIBB (as consulting engineers) with Rainbow Construction (as contracting engineers) joined as a team to undertake the Passenger Rail Agency of South Africa's (PRASA) Kempton Park Rhodesfield Station design and construction project. This R125 million traditional mainline railway station for trains running between Johannesburg and Pretoria is adjacent to the high-speed Gautrain Rhodesfield Station, with trains coming in from Sandton to OR Tambo International Airport. While the two stations are a mere 20 m apart, PRASA's lines pass diagonally under Gautrain's viaduct. By building the PRASA station adjacent to the Gautrain station, commuters will be able to transfer from one train system to the other. The station facility will serve the increased rail commuter demand for the rapidly developing Rhodesfield suburb, which is currently being redeveloped to support the growing airport industry.

The station consists of an aerial concourse over the two new island platforms with the eastern station entrance connecting to the Gautrain Station precinct and the western station entrance connecting to a dedicated intermodal facility. This project is considered the future for transportation in Ekurhuleni as it is the first ever tri-modal transportation hub, joining Metrorail with the Gautrain Rapid Rail and associated Gautrain Feeder Bus system, as well as other public transport modes, bus and taxi services.

### Project scope

The scope of the project, a design and construction project with the typical tight deadlines associated with such a project, included modified rail infrastructure: Track, signalling and overhead electrification, as well as the structural, electrical, mechanical



**ABOVE RIGHT** The Rhodesfield stations, PRASA on the left and Gautrain on the right

and all civil works of the station, taking into account facilities for the disabled.

### Existing services

It is usual in a project in a built-up area, despite the site recently being vacated by Gautrain's Bombela Consortium's contractors, to check for existing services – electricity cables, Telkom cables, water reticulation, storm water drains and sewage lines. In this case, a small electrical substation to one side and out of the way – and a storm water drain crossing the site, which was used for this project – were fortunately the only services other than the existing railway lines that needed consideration.

Remodelling the rail infrastructure required the realignment of three of the four railway lines over a 3.6 km distance to create space for the construction of two 275 m-long island platforms 9 m wide. Associated signalling and overhead 3 500 V electrification works also had to be moved. And all of this had to happen while trains continued running. Only one instance of a train being stopped occurred and, as fate would have it, it had to

be the Blue Train. However, given the once-in-lifetime opulent luxury travel experience, the passengers did not complain about the extra few minutes added to their journey.

### Safety

While moving the railway lines, one railway consultant, four safety officers and eight specially trained flagmen were used to ensure worker safety. Today, in the final stages of the project, this has been reduced to one safety officer and eight flagmen. So far, not a single fatality has occurred.

As a general safety rule, Transnet imposes a 'no work within 3 m from the centre line of a railway line' safety distance. While this was a necessary restraint, with the much-appreciated cooperation of Metrorail, project dates were met. It just required tightly coordinated project activities across disciplines. However, one instance of rule breaking was required, with Transnet's blessing, when one pile had to be sunk. The gap between the piling machine and the train was a mere



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**ABOVE LEFT** A train passes under the 'in construction' station

**ABOVE RIGHT** The main station entrance on the left, the ticket office left centre with the main concourse on the right



roof, which sloped down inwards to a central gutter beam. This gutter beam collects rain-water from the roof, channels the water into multiple 150 mm feeder pipes that connect to a 200 mm horizontal central pipe, which

in turn connects to a 300 mm down pipe. The storm water then flows into a 400 mm x 400 mm channel and before flowing into an attenuation dam via a 450 mm concrete storm water pipe. From the attenuation dam, the storm water flows into a local stream via a 450 mm concrete storm water pipe. Owing to the construction sequence and time constraints, the roof was designed and constructed in phases to suit the construction

programme, allowing certain areas of the concourse to be covered where the wet works could commence.

In conclusion, with integrated precincts to ensure seamless pedestrian transfer between the two stations, on-site private vehicle parking areas, PRASA's station and Gautrain's station are well on track to usher in Ekurhuleni's first-ever tri-modal transportation hub. **35**

