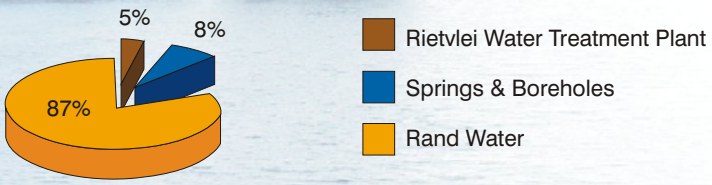
Facts about the Rietvlei Dam

* It was constructed between 1932 and 1934 in the Sesmyl Spruit near Pretoria, which is situated in the Rietvlei Nature Reserve, which covers 3 200 hectares
* Dam wall : 32 metres high
* Capacity : 12 000 000m³
* Surface area : 1,87 km²
* Yacht and canoe club

Facts about the Treatment Plant

* The Plant was established to meet Tshwane's drinking water requirements
* The first 18 Ml/d Plant was built in 1934
* The treatment capacity of the Plant was increased in 1988 to 40 Ml/d
* The Plant saw the first full-scale application of the **D**issolved **A**ir **F**lotation and **F**iltration (DAFF) process in South Africa
* The new **G**ranular **A**ctivated **C**arbon (GAC) filtration system was completed in 2000 and is the first operational application of open bed gravity filters for drinking water treatment in South Africa

Tshwane Daily Water Requirements



For more information on the Rietvlei Water Treatment Plant, please contact :-

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CITY OF TSHWANE
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Water & Sanitation Division
Public Works and Infrastructure Development

National Award Winning Project for Engineering Excellence
DWAF Award: Most Presentable Medium Size Water Works 2009

Rietvlei Water Treatment Plant

Water Treatment Steps

STEP 1
Water is abstracted from the Rietvlei Dam by means of an inlet tower. Three different abstractions points at varying levels in the tower can be used, depending on the water quality at those points.

STEP 2
Chemicals called flocculants (ferric chloride and aluminium sulphate), are added to the water to make the particles in the water bind together and form flocs. The water in the dam is characterised by a very low turbidity (cloudiness of the water) but has extremely high algal activity, including blue-green algae, which is known to produce toxins and can cause taste and odour problems in the drinking water. Lime is also added at this stage to stabilise the water. Stabilisation (buffering) ensures non-corrosive conditions in the structures of the unit processes.

STEP 3
The water is flash mixed and flows slowly and evenly through a series of baffled channels called flocculation channels, which allow the flocs to grow.

STEP 4
From the flocculation channels the water enters the **D**issolved **A**ir **F**lotation/**F**iltration (DAFF) process, which removes all the particles that have just been formed in the flocculation channels. This process can be divided into a flotation and filtration process. Because the water in the dam is eutrophic (high algal concentrations) it was decided to use a flotation instead of a sedimentation process. Algae floats rather than sinks and therefore its natural properties are used to clean the water.
A stream of clean water containing large quantities of air (supersaturated) is passed through a bank of nozzles at the inlet of the filter.
The flocculated water is then passed over the supersaturated water and this releasing the air from the liquid phase, causing bubbles to attach to the flocs and rise - this is the flotation process. This process is so efficient that the flotation process alone removes about 70% of the suspended particles in the water. These particles form a scummy brown layer on the surface of the filter area, which is all that can be seen from above. Underneath there is a filter bed made up of various sizes of sand. The water passes through the sand filter, which removes the rest of the particles left in the water - this is called the filtration process.

STEP 5
Owing to the hydraulics of the older section of the Plant, some height was needed for the water to gravitate through the next section of the Plant. Two 10m Archimedean screw pumps have been installed and lift the water some 4,5m. From here the water gravitates through the remainder of the Plan.

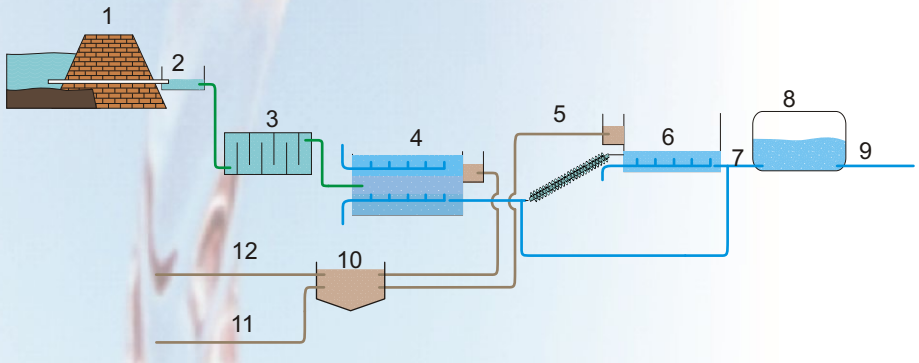
STEP 6
Although the DAFF process is very effective at removing the flocculated particles from the water, it is unable to remove dissolved organic matter (this includes colour, odours and tastes caused by the algae present in the water). Granular Activated Carbon (GAC) filtration is used to remove the organic matter by adsorption. Since GAC filtration has been introduced, the colour, odour and taste of the water have improved noticeably.

STEP 7
Although the water has passed through both the DAFF and the GAC process and seems to be clean, it still requires disinfection, which is accomplished by means of chlorination. Chlorine gas is used to kill all the remaining bacteria and viruses still present in the water. Chlorine is the most effective disinfectant because it has a residence time of several hours. (This means that the water is protected from contamination and growth of bacteria while it moves through the pipelines towards the storage reservoirs and eventually to the consumer).

STEP 8
The water flows into an on-site storage reservoir where water from fountains in the nature reserve is added**.** This reservoir serves as a chlorine contact chamber where the chlorine has time to work and ensure effective disinfection.

STEP 9
From the reservoir, the water is pumped to two of the largest storage reservoirs in Pretoria. At the storage reservoirs the water is blended with water provided by Rand Water and water from other boreholes. The water is now ready for consumption by the consumer.

STEP 10-12
The DAFF and GAC filters are cleaned by regular backwashing. The backwash water flows into settling tanks. These settling tanks act as holding tanks for the dirty water and allow settling of the particles to take place. After a retention time of two hours the settled sludge is pumped away into the sewerage system and the relatively clean water (supernatant) gravitates back into the river downstream of the dam.



Rietvlei Water Treatment Plant