

Tertiary Treatment at the Benidorm Waste Water Treatment Plant

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Reusing effluents from municipal wastewater treatment plants is becoming more and more common. Because of the increase in the uses made of water as well as the increase in population, traditional sources have become insufficient to meet the demand for water. Therefore, in recent years treated wastewater has become an additional resource of water for a number of purposes.

Location	Benidorm (Alicante)
Customer	Consellería de Infraestructuras y Transporte de la Generalitat Valenciana
Construction period	12 months
Capacity	33,318 m³/day

Benidorm tertiary treatment is planned for the reuse of waste water treated at the present Wastewater Treatment plant as indiscriminate agricultural irrigation. This project is a part of the policy of promoting maximum use of waste by the Valencia Administration.

The need to obtain water with a conductivity of less than 1,000 $\mu\text{s/cm}$ makes it necessary for tertiary treatment to include a

desalination process, and the desalination process chosen is through the use of inverse osmosis membranes.

Water properties

	Influent	Treated Water
DBO ₅	30 mg/l	≤ 10 mg/l
SS	40 mg/l	≤ 5 mg/l
pH	7.2	6.5-7.5
Faecal coliforms	10⁵ u.f.c./ 100cc.	< 200 u.f.c./ 100cc.
Conductivity	3,800 $\mu\text{s/cm}$	1,000 $\mu\text{s/cm}$
Helminth eggs		< 1 egg/litre

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Initial design of tertiary treatment at the Benidorm wastewater Treatment Plant is planned with the following facilities:

- Effluent connection and collection facility at the treatment plant
- Flow rate control tank
- Tertiary treatment pump
- Preliminary screening of water with 500 μ filter
- UF system using membranes, as pre-treatment for the osmosis process
- Control tank
- Desalination process using reverse osmosis membranes
- Final disinfection of the water produced
- Connection to irrigation tank

Ultrafiltration

The filtration system selected for the Benidorm Wastewater Treatment Plant is an Ultra filtration system using Zenon Zee-weed immersed hollow-fibre membrane. The membrane has a nominal pore size of 0.034 μ .

The ultra filtration installation has a production capacity of 30,000 m³/day. The plant consists of 6 ultra filtration lines, with 4 cassettes per line and a total filtration area of 53,510 m². The conversion rate designed is 90%.

Reverse Osmosis

To reduce raw water conductivity from 3,800 μ S/cm to the required level of 1,000 μ S/cm, a reverse osmosis installation has been designed for 83% of the water flow rate produced in ultra filtration (25,000 m³/day).

The reverse osmosis conversion designed is 78%, with a dual phase 2:1 configuration, and a booster pump between stages. The plant has three reverse osmosis housings, and total water production is 19,500 m³/day. The reverse osmosis membrane selected is a low dirt brackish water membrane.

The water produced in osmosis, added to the blending flow rate of the installation (5,000 m³/day) produces a flow rate of water for reuse of 24,500 m³/day, which means an overall plant conversion rate of 81.7%.