

# Wastewater Treatment in Estoril Coast Sewerage System (Portugal)

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The Waste Water Treatment of the Estoril Coast includes the sewerage system and waste water purification of the area between Amadora and Sintra, including the whole of Cascais, a large part of Sintra and Oeiras, as well as a part of the Consejo de Amadora. The system has a total surface area of 22,000 hectares and an equivalent population of 720,000 e.i.

Location	Cascais (Portugal)
Customer	Saneamento da Costa de Estoril (Sanest)
Construction period	33 months
Ending date	2010
Capacity	172,800 m <sup>3</sup> /day
Population	720,000 e.i.

The contract is made up of three different parts:

The **Water Treatment** is located in the municipality of Cascais very close to the existing Guia WWTP. The new facility has been located underground, so only the control building and the power station are above ground level.

The **Water Line / Sludge Line Connection** is developed in an urban area with a length of 4,300 km and includes the sludge drive pipes, the supernatant return to the water line, a medium voltage electricity line to feed the water line and the service water drive line.

The **Sludge Treatment** is located in the town of Alcabideche, 4,300 m away from the water treatment, and in that facility is where the sludge treatment is carried out.

## Water treatment

Since the water line is located in a tourist area sensitive to visual impact and because of the reduced size of the available plot, it has been built on two levels below ground level. The carried out excavation reaches a depth of 25 m below ground level, and a total of 150,000 m<sup>3</sup> of earth and rock were removed.

The present plant is sized to treat a maximum flow of 346,000 m<sup>3</sup>/d and has the capacity for a future enlargement of 30%, up to 450,000 m<sup>3</sup>/d.

The water characteristics are as follows:

	Influent	Effluent	Reuse effluent
BOD <sub>5</sub>	335 mg/l	< 167 mg/l	< 10 mg/l
TSS	260 mg/l	< 40 mg/l	< 10 mg/l
Faecal Coliforms	10 <sup>6</sup> UFC/100 ml	<2000 UFC/100 ml	<10 UFC/100 ml

The facilities that the water line includes are:

- Sieved water pumping station in the existing plant, feeding the new water treatment line.

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- Three grit and grease removal chambers.
- Mixing and flocculation chambers with chemical dosing of polyelectrolyte, ferric chloride and aluminium polychloride.
- Three primary lamella settlers.
- Pumping to the above level, where 16 sand filters are situated.
- Each of the 16 sand filters have their own associated facilities for cleaning. There is a collection tank for the cleaning water that is pumped to the mixing chambers to be incorporated to the treatment.
- A final disinfection system of 480 medium pressure UV lamps.
- A water replacement channel to the existing marine outflow.

The sludge coming from the lamella settlers are conveyed to a sludge tank, from where it is pumped to the sludge treatment by 4 helicoidal screw pumps of 160 m<sup>3</sup>/h capacity and 140 mwc. There are also 4 submersible centrifugal pumps for returning the sludge to the physical/chemical treatment.

After the primary treatment there are also two more pumps that drive a part of the flow to a biological treatment to produce water to reuse it for irrigation, with a capacity of 9000 m<sup>3</sup>/d, and which is formed by:

- 1 biological reactor with anaerobic chambers.
- 2 secondary lamella settlers.
- Pumping arrangements for excess sludge to the general sludge chamber and sludge recirculation.
- Pumping of treated water to two pressure filters located in the upper level.
- An UV disinfection system by 36 medium pressure lamps, before the final drive system. A part of the flow is pumped to the sludge treatment facility to supply the services network.

## Sludge treatment

The sludge treatment line consists of:

- 2 collection tanks for sludge coming from the water line. These tanks also receive the sludge from the sieving area of sludge from sewer and septic tank cleaning trucks.
- Thickening by centrifuge, 4 in total, 120 m<sup>3</sup>/h.
- Digestion pumping.

- Anaerobic digestion with all its facilities for sludge heating and agitation by means of compressors and biogas lances. There is a total of three digesters, each of 7,300 m<sup>3</sup>.
- 2 digested sludge tanks.
- Sludge dewatering by 4 centrifuges of 40 m<sup>3</sup>/h.
- Conveying to two sludge storage silos of 125 m<sup>3</sup> by means of two dewatered sludge pumps.
- Two conveyor screws run from these silos and transport the sludge to the thermal drying arrangements.
- There are 2 thermal drying lines for treating the sludge from the mechanical drying, with a combined evaporation capacity of 7,000 kg/h, designed to obtain a final dryness of 90%. The dry sludge can be sent in powder or pellet form to another two 60 m<sup>3</sup> storage silos.

The sludge line has an installation for using the biogas produced; this installation comprises:

- Gas storage in two membrane gas holders, each of 2,150 m<sup>3</sup>.
- A system for removing the H<sub>2</sub>S in the biogas by means of NaOH.
- The biogas can be used in the digestion heating boilers or in the cogeneration system.
- The cogeneration system consists of three motor-generators each delivering 970 kW of electric power. One of them will work with biogas and two with natural gas. The heat dissipated in the different circuits is employed for heating the sludge in digestion as well as the exhaust heat is used for the actual thermal drying.

## Auxiliary facilities

Both the water line and the sludge line are equipped with the following auxiliary facilities:

- Odour treatment and odour control.
- Service water and air facilities.
- Fire-fighting facilities.
- Gas detection facilities.
- Electrical, automation and control facilities of the WWTP.