



# Wastewater Treatment Plant in Burgos

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The different flows of sewage to be treated in this plant are collected in two sewers, a general one carrying the sewage from the city of Burgos and from the Gamonal/Villimar estate and another which receives the flow from the Villalonquejar industrial estate.

Location	Burgos
Client	Government of Castile and León Burgos City Council
Timetable	12 months
Capacity	135,000 m <sup>3</sup> /day
Date	1991

The considerable increase in these flows as well as the pollutants in the effluents in each of the sewers required the enlargement of the existing treatment station including a new treatment line designed for the flows and pollutants from the Villalonquejar sewer while improving and completing the existing installations.

The two lines, with a total treatment capacity of 135,000 m<sup>3</sup>/day, include pre-treatment, primary and biological treatment with active sludge, with similar operational features but matching the flows and loads. Because of its highly industrial nature, the Villalonquejar treatment line includes physical and chemical treatment with mixture, flocculation and coagulation with the addition of chemical reagents followed by neutralising.

The most important installations in the pre-treatment in each line include a coarse matter pit with prior screening, screening of fine solids with automatic sieves with a pass of 3 mm, grit and grease removal in combined channels with pre-aeration, extraction and washing of grit, concentration of grease and extracted floating matter, finally followed by a flow measurement system.



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Primary sedimentation with purging and pumping of settled sludge is verified in six circular gravity units, four 33 m in diameter in the general sewer line and two 25 m in diameter in the Villalonquejar sewer line.

The conventional activated sludge biological process is used in both lines with an anoxic area at the head of approximately 20% of its total volume.

The newly-built biological reactor consists of two lines each with a capacity of  $80.90 \times 16.50 \times 4.50 \text{ m}^3$  which complete the  $19,887 \text{ m}^3$  of the existing biological reactor. The air required by the process is supplied by three turbo compressors and injection into the liquid with fine bubble diffusers. Oxygen is supplied in the old biological reactor by fixed vertical turbines.

Secondary sedimentation consists of six suction type units 40 m in diameter, four forming part of the old biological treatment and two new ones in which a set of sluice gates allows their use jointly or separately by lines.

The biological treatment is completed with installations for active sludge recirculation pumping and the purging of exceeding sludge.

The treated water is discharged directly to the River Arlanzón through flow measurement in a Parshall channel that is common to the two lines.

The sludge treatment lines installations are designed as a single line, common to the two sewage treatment lines, although there are isolation and connection devices to allow some of its processes to receive specific or different treatments, depending on their origin.

After screening, the primary sludge is thickened in gravity units, two 12 m in diameter and newly built for Villalonquejar and two old ones, 13 m in diameter, for the general sewer, all equipped with automatic purging and pumping of thickened sludge to digestion using horizontal screw pumps.

The biological sludge produced in the system is thickened in three flotation units using dissolved air injection, one of them newly built and 12 m in diameter with a pressurised system, prior chemical treatment of the sludge and pumping of floating sludge to digestion.

Anaerobic digestion of the thickened sludge takes place in two stages, a primary one with two units each with a volume of  $6247 \text{ m}^3$  and a secondary unit with a capacity of  $4042 \text{ m}^3$ , equipped with the necessary additional installations for stirring by digestion gas using lances and compressor and sludge heating with two boilers and four heat exchangers.

The digested sludge is dried in four band filters with a band width of 2.5 m which complete the three existing units with a common system for chemically treating sludge with polyelectrolyte and removal using endless screws and conveyor belts to a storage silo.

The gas produced in the digestion is stored at low pressure in three double membrane gasometers each with a capacity of  $800 \text{ m}^3$  for use in a co-generation system that produces electricity with three generator sets of 280 kW each for use in the plant or for supply to the mains. The heat energy is recovered for use in the system for heating sludge in digestion.

The sewage and sludge treatment installations are completed with all the auxiliary installations that allow or facilitate the operating and maintenance conditions.