

# Municipal Wastewater Treatment Plants in Campiña Sur, Extremadura

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The Campiña Sur Project includes ten treatment plants, each one with its inlet pipes. They are located in the province of Badajoz in southern Spain and serve the towns of Llerena, Fuente de Cantos, Granja de Torrehermosa, Hornachos, Usagre, Llera, Maguilla, Valencia de las Torres, Ahillones and Casas de Reina.

Location	Towns of Campiña Sur (Badajoz)
Customer	Ministry of the Environment
Capacity	96,000 m <sup>3</sup> /day
Population	96,000 e.i.

In addition to the above, a pump station and wastewater pipe were designed to convey the wastewater from Oliva de Mérida to the existing plant in Guareña. Furthermore, due to the poor condition that the municipal wastewater plant in Campillo de Llerena, a new treatment plant had to be built there to replace the old one with a much more complete facility comparable to those of the other towns.

The biological process used in these treatment plants is especially important as it works with prolonged aeration which has the following

advantages:

- It eliminates nitrogen by the nitrification-denitrification process produced thanks to the oxic and anoxic conditions in the different zones of the biological reactor.
- The average time that the water remains in the process is 24 hours, whereby homogenization is reached without the need to use complementary mixing tanks.
- A sludge digester is not required since the biological reactor uses the prolonged aeration system in which the sludge is stabilized in the reactor itself.
- Since there is no primary settling nor sludge digestion, no pumps are needed to extract primary nor digested sludge.

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### Flow rates

Town/Plant	Number of e.i.	Average Flow (m <sup>3</sup> /h)	Biolo Q <sub>peak</sub> (m <sup>3</sup> /h)	BOD <sub>5</sub>		S.S.	
				Input (Kg/day)	Outlet (mg/l)	Input (Kg/day)	Outlet (mg/l)
Llerena	22,000	229.17	458.34	1,320	≤ 25	1,980	≤ 35
Fuente de Cantos	16,000	166.67	333.34	960	≤ 25	1,440	≤ 35
Granja de Torrehermosa	1,000	125.00	250.00	720	≤ 25	1,080	≤ 35
Hornachos	10,000	104.17	208.34	600	≤ 25	900	≤ 35
Usagre	8,000	83.33	166.66	480	≤ 25	720	≤ 35
Llera	4,000	41.67	83.34	240	≤ 25	360	≤ 35
Maguilla	4,000	41.67	83.34	240	≤ 25	360	≤ 35
Valencia de las Torres	4,000	41.67	83.34	240	≤ 25	360	≤ 35
Oliva de Mérida	4,000	41.67	83.34	240	≤ 25	360	≤ 35
Ahillones	4,000	41.67	83.34	240	≤ 25	360	≤ 35
Campillo de Llerena	8,000	83.33	166.66	480	≤ 25	720	≤ 35

The following is a summary of the treatment lines used at these plants:

#### Water line

- Inlet and general by-pass works, the latter to be used to handle the excess when the incoming flow is greater than the plant's capacity.
- Solids pit where preliminary grit removal is done to eliminate gravel and large sand carried in the water which happens mainly during the rainy season.
- Pumping of the raw water.
- Roughing by 3 mm rotating screens.
- Grit and FOG removal using a combined system of longitudinal aerated channels.
- Flow gauge and control.
- Biological treatment carried out by prolonged aeration in a reactor normally with a concentric circular profile with the decanter or carousel. The reactor has both anoxic and oxic zones.

- Secondary settlement tank with one or two units.

- Flow meter for the treated water.

- Sterilization in which the effluent is disinfected using sodium hypochlorite, the average doses being 6 ppm.

#### Sludge line

- The exceeding biological sludge produced in the process is pumped away.
- Sludge is recirculated from the bottom of the settlement tank at the inlet to the reactor in order to restore the active sludge in the biological reactor that passes from it to the secondary settlement tank.
- Thickening by gravity.
- Sludge dehydration by drying centrifuge.

The complementary works carried out for this job include a drainage system to improve the operation, exploitation and maintenance of the installations, as well as updating the municipal wastewater networks and sewage outfalls.