

Sewer, outfall and urban and industrial sewage treatment station in Ágreda and Ólvega

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The municipalities of Ágreda and Ólvega are located in the province of Soria. They contain various industries that make both the focus of attraction for the population of the adjacent municipalities who travel to these localities to work in these industries.

Location	Ágreda (Soria)
Client	Government of Castile and Leon
Timetable	26 months
Capacity	3800 m ³ /day
Population	9400 eq-inhab

This project involves building the mains taking the sewage from Ólvega and its industrial estate to the Ágreda general sewage system and the general sewer leading the outlets of both places to the Ágreda sewage treatment station. Here the elements needed to treat the sewage correctly before being discharged to the River Queiles or Val were sized and built according to the following parameters.

	Inlet	Outlet
DBO ₅	541 mg/l	< 25 mg/l
DQO	527 mg/l	<125 mg/l
SS	300 mg/l	< 35 mg/l
N _{TOTAL}	40 mg/l	< 15 mg/l
P _{TOTAL}	16 mg/l	< 2 mg/l

This contract thus included the following actions.

- Ólvega sewer (of PVC, 500 mm) to the trunk with the general Ágreda sewer to remove the sewage from Ólvega.
- Ólvega industrial estate sewer (of PVC, 315 mm) to the general sewer.
- Diversion and channelling of the De la Vega River.
- General sewer from Ágreda to the sewage treatment station, of PVC, 500 mm. This sewer can carry six times the average flow.
- Ágreda and Ólvega sewage treatment station.
- Access track, drinking water connection, electrical connection and telephone connection.
- Operation of the treatment system for one year.

Given that there is a large difference between the winter and summer flows, this was taken into account in the design to set the number of treatment lines, two for water and one for sludge. This allows operation with two lines in the winter – although the installations are

oversized in this case -- and with two in summer.

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Water line

- **Raw sewage pumping station.** This consists of a coarse matter pit with a volume of 24 m³, equipped with a double scoop with a capacity of 500 l for removing residues, and one coarse solids screen with a pass of 50 mm and manual cleaning. The raw sewage is pumped by four underwater centrifugal pumps of 268 m³/h with a lifting height of 8 m water column.

- **Pre-treatment.** This phase includes the operations of screening fine solids using three (2 + 1) rotating screens with a pass of 3 mm and a bypass channel with a manual solids screen with a pass or 15 mm.

- **Grit and grease removal** takes place in an aerated channel measuring 12.50 x 2 x 2.20 m with a mobile gantry to remove grit and grease. Air is supplied to the grit remover by two Aeroflotts located in the grit remover itself. Grit is removed by a vertical centrifugal pump with a flow of 23.40 m³/h. The grease and floating matter removed by the gantry are discharged at intervals to a grease concentrator with a capacity of 20 m³/h.

- **Biological treatment** is carried out in two biological reactors each with a volume of 1503.45 m³. The treatment involves a low load active sludge process (prolonged aeration) with the elimination of nitrogen by biological means (nitrification/denitrification) and the removal of phosphorus by chemical means.

Air is supplied by three (2 + 1) blowers and is distributed to the biological reactors by 400 fine bubble diffusers.

- **Secondary decanting** consists of two conventional type circular units 15 m in diameter with a system for extracting and evacuating the floating matter with two pumps each of 11.40 m³/h and a pressure height of 5 m water column. The decanted sludge is sent to the sludge recirculation and purging catch pit.

- **Discharge of effluent** to the River Queiles.

Sludge line

- **Recirculation of biological sludge** to the biological reactors.

- **Extraction of excess biological sludge** and its pumping to the gravity thickening.

- **Gravity thickening of sludge:** the sludge generated in the secondary treatment is purged from the secondary decanter and sent to a gravity thickening unit 8.50 m in diameter. The thickened sludge is pumped to drying by two 6 m³/h helical screw pumps (one in standby).

- **Drying:** the drying consists of two stages. The first consists of flocculation and the chemical treatment of the sludge using polyelectrolyte and the second is the drying itself using a centrifuge. The flocculated sludge is inserted into a centrifuge with a capacity of 8 m³/h.

- **Storage of dried sludge and removal:** the dried sludge is stored in a hopper with a capacity of 20 m³ and later sent to a controlled tip; the possibility of its re-use for agricultural purposes is being studied.

After being treated and analysed, the sludge from the treatment plant will have at least the following properties:

- Dryness (% in weight of dry solids) ≥ 20%
- Stability (% reduction in weight of volatile solids) ≥ 55%

Auxiliary installations

- **Electrical installations, instrumentation and control**

- Transformer centre.
- Power correction equipment.
- Low voltage installation.