



ORIGINAL NEED

Agricultural company of Spannocchia utilized, as supply for potable use and irrigation, underground water disposed 15 m deep. After the development of the agricultural and tourism activities, the level of the groundwater has lowered of 4 m in the last 3 years.

Moreover, the most of the wastewater produced was not treated and was discharged directly to the soil, putting in great danger the quality of underground waters.



Therefore we judged necessary to ensure a balance between the availability of water resource in the area and the different needs, in respect of the existing laws.

Considered that the company is placed inside the natural reserve of “Alto Merse”, which has high environmental value and presents different binds for landscape, geological and archeological interest (in the zone traces of etruscan culture are present), we judged that a natural depuration system was the most appropriate solution.

LOCATION

Municipality of Spannocchia
Province of Siena
Tuscany
Italy

COMMITTANT

Azienda Agricola Spannocchia

NUMBER OF PERSON EQUIVALENT

60

WASTEWATER TYPOLOGY

Civil

PLANT TYPOLOGY

SFS-h (2 basins) + FWS

AREA (M2)

160

YEAR OF REALIZATION

1999

COST

€ 15.500

DESCRIPTION

Here we illustrate only the treatment and the collection systems. Wastewater is collected to a primary treatment system (three-chamber tank), then is treated by a horizontal subsurface flow constructed wetland, and finally is stored in a basin for irrigation aims.

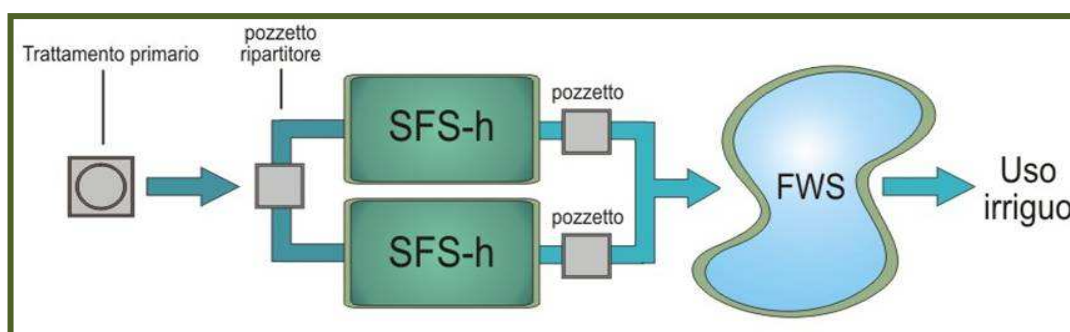
The project is composed by one side of the treatment of wastewater and the collection of treated water, by the other side the recover of rainwater.

In fact, hydraulic retention time is 3.4 days, which is sufficient for 90% removal of bacteria, but not enough for a complete nitrification-denitrification process (De Maeseneer et al. 1997). The plant is designed for treating wastewater of 60 P.E.

The system is composed of a primary treatment with Imhoff septic tank, two SFS-h basins in parallel, one post-treatment basin with free water surface with the function of storage for irrigation aims. Vegetation specie is *Phragmites australis*. In the final storage basin the vegetative species are: *Phragmites australis*, *Typha latifolia*, *Iris pseudacorus*, *Nymphaea alba*, *Myriophyllum aquaticum*.



The goals in designing the horizontal subsurface flow basins have been of removing nutrients not too much, because they need for irrigation of cultivated areas, and, on the opposite, of strongly removing microbial of faecal origin.



Scheme of the plant

