



# Morgex New Phytoremediation Plant

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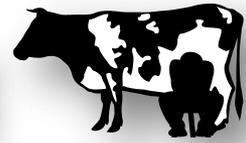


Etat du Valais



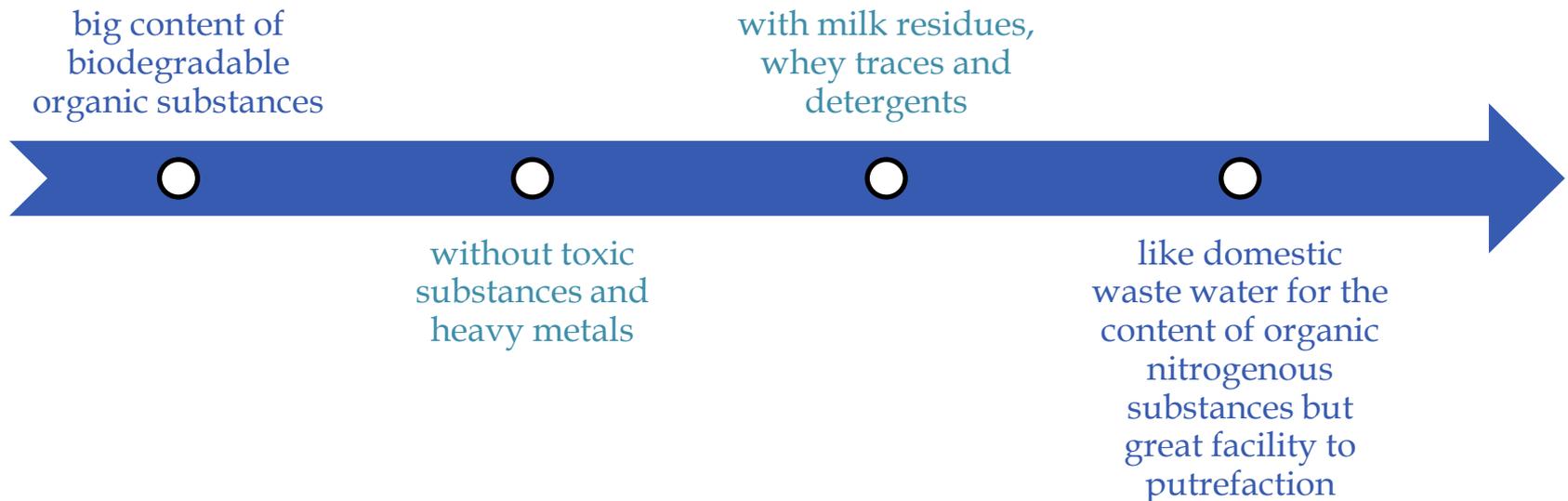


# INTRODUCTION



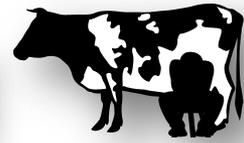
Project Rurecotec Objective: to study and to compare different innovative solutions to the depuration of cheese factory waste water.

Waste water defined as follow





# WASTE WATER TREATMENT



## PHYTODEPURATION

**AIM:**  
**to propose the best technologies for waste water depuration**

It's a natural depuration system of waste waters. It's made of waterproof basin full of gravelly material and plants.

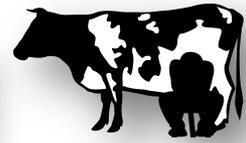
The depuration is made through the joint action of gravelly substrate, plants, waste water and microorganisms presents.

Consist in the use of plants to remediate waste waters

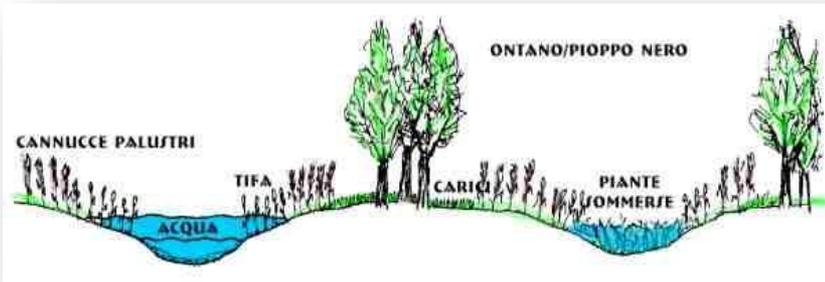
The elimination of nutrients and bacterium is made by the filtration, adsorption, assimilation of plant and bacterial degradation

The phytodepuration plant is a favourable alternative for economical and environmental aspects

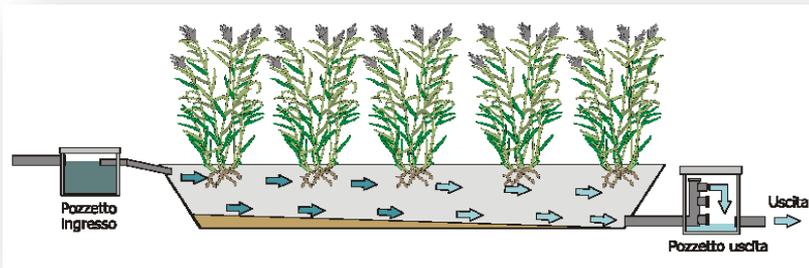




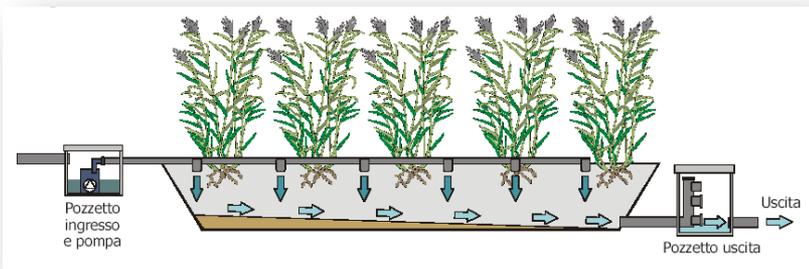
## PHYTODEPURATION TECHNIQUES



1. FWS – Superficial flow



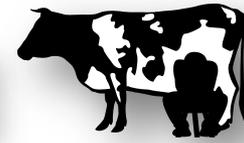
2. SSF-H – Sub superficial flow (horizontal)



3. SSF-V – Sub superficial flow (vertical)



# MORGEX CHEESE FACTORY



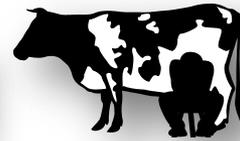
## PHYTODEPURATION TECHNIQUES APPLIED TO THE MORGEX CHEESE FACTORY

Parameters	pH	TSS (mg/l)	BOD <sub>5</sub> (mg/l)	COD (mg/l)	Total phosphorus (mg/l)	Total Fat (mg/l)
Cheese Factory outlet values	4,1-5,1	228-491	1100-1250	1776-3042	12-15	948-1174
Law Limits	5,5-9,5	200	250	500	10	40

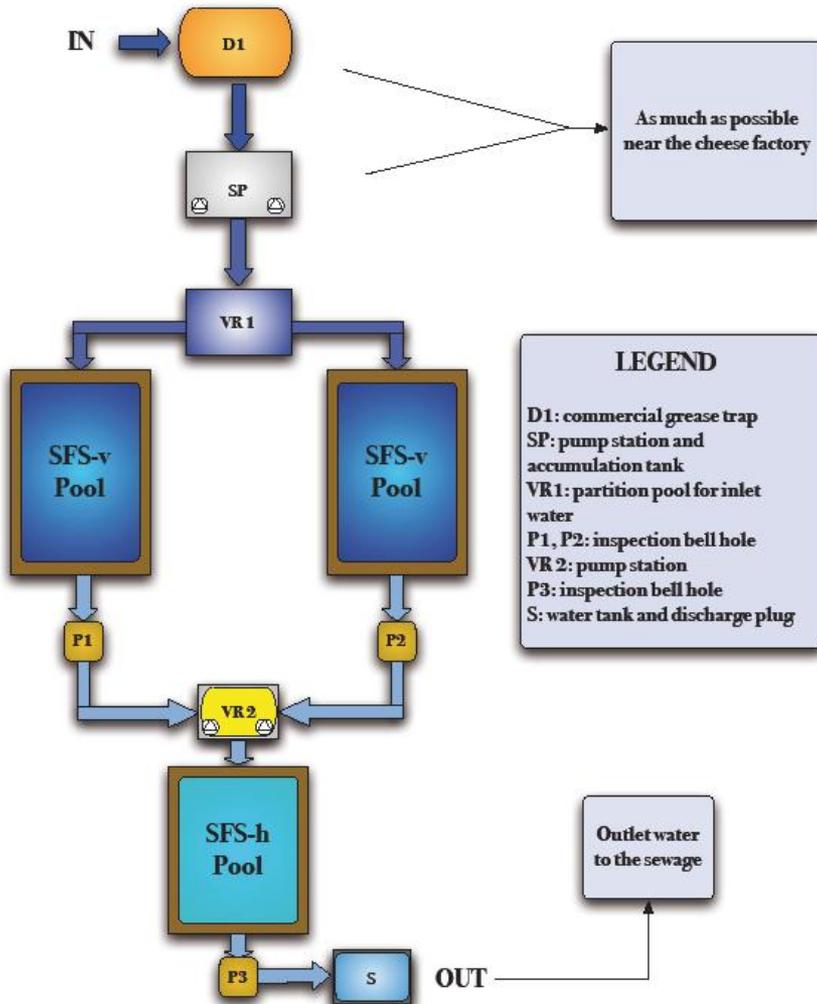
Parameters	TSS	BOD <sub>5</sub>	COD	Total phosphorus	Pathogen Microorganism
Reduction (%)	70 - 95	85 - 95	85 - 95	50 - 90	97 - 99.9



# MORGEX CHEESE FACTORY



MORGEX CHEESE FACTORY PLANT SCHEME

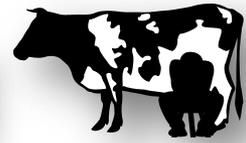


Preliminary scheme.

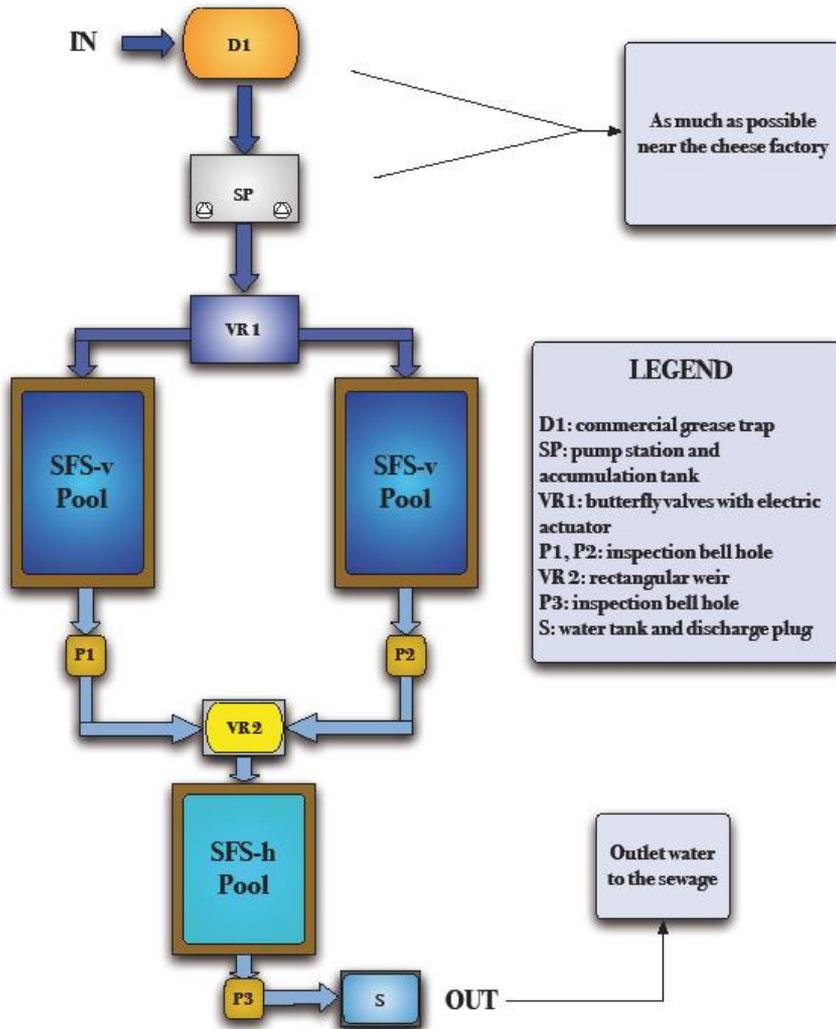
Three phases, a first pre-treatment just outside the cheese factory for the reduction of the fat part and for the need to pump the fluid in pools head. A first phytoremediation treatment in a vertical flow pool, and after a session inside an horizontal pool to refine the water. The processed water will be checked and released into the public sewer.



# MORGEX CHEESE FACTORY



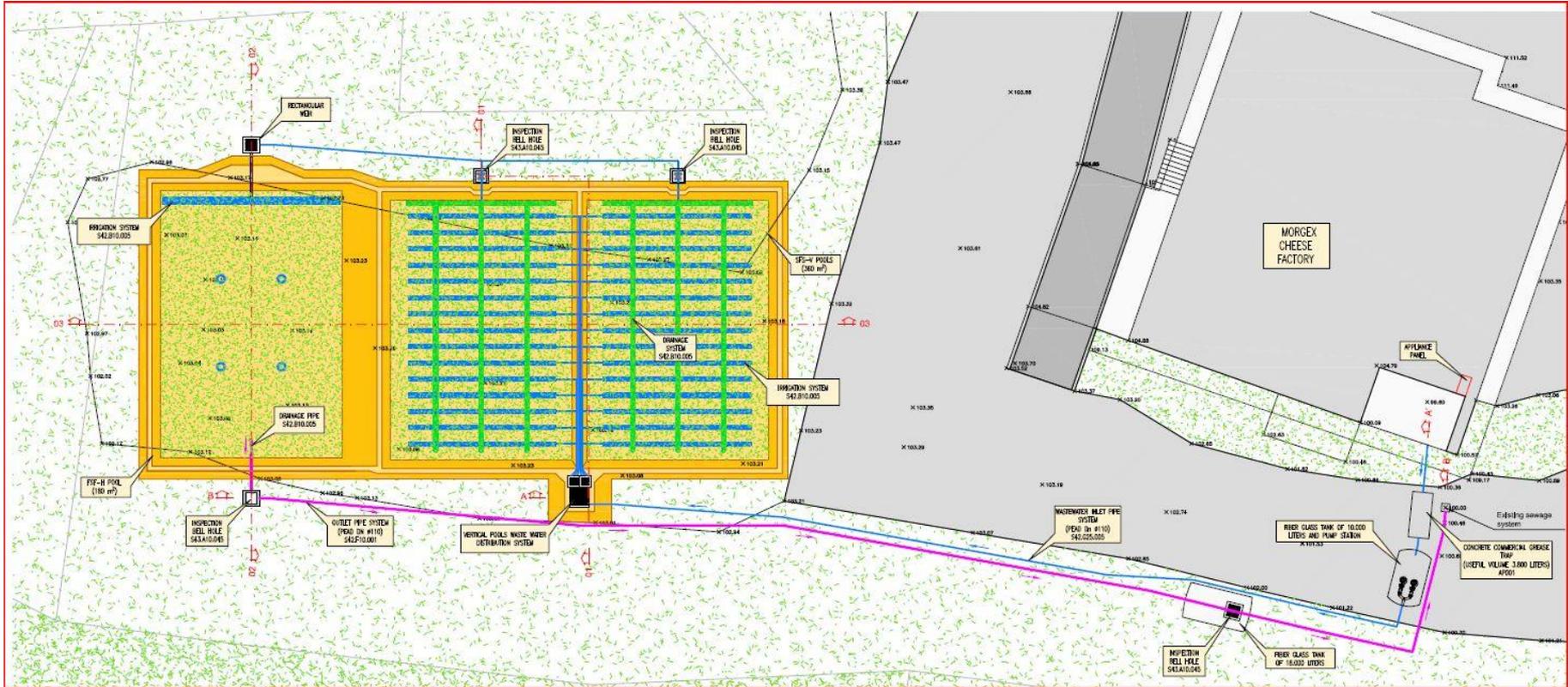
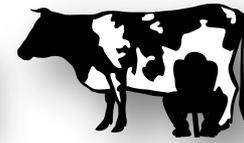
MORGEX CHEESE FACTORY PLANT SCHEME



## Executive scheme.

As the previous scheme with little but significant differences. The system at head of the two vertical pools is managed by a butterfly valve with an electric actuator. There are no other pump station, and the flow at the horizontal pool will be managed by the height difference and regulated by a rectangular weir.

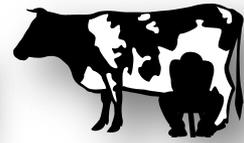




Some technical data:  
20 m<sup>3</sup> of daily production, the design head is of 7,5 m, all the systems are auto activated, the needed vegetal plants are taken for a nearby ecological area.



# WASTE WATER TREATMENT

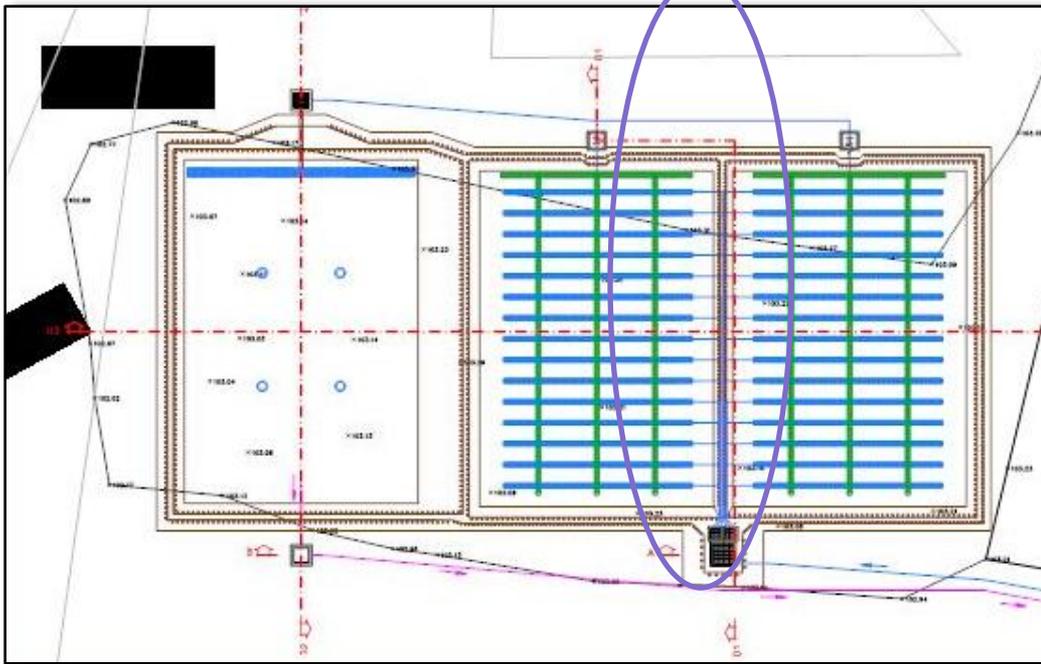


## SOME TECHNICAL SPECIFICATIONS:

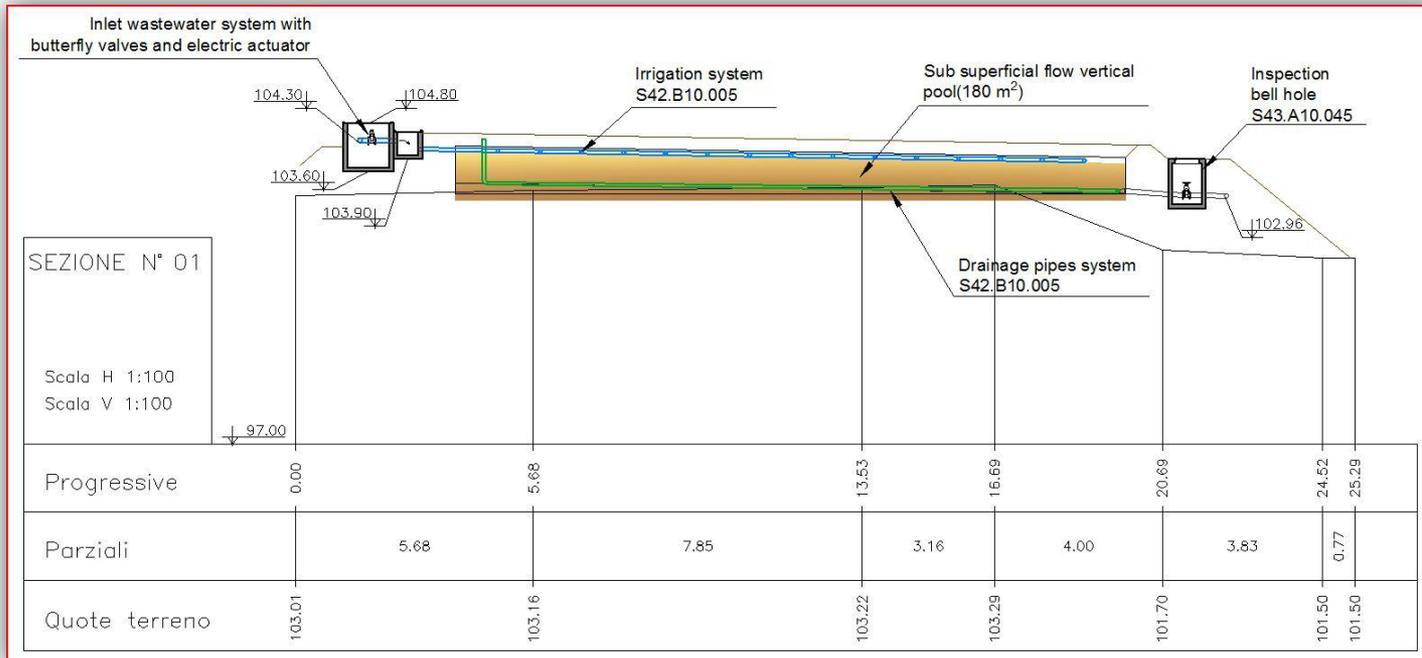
1. Grease trap of 3800 l
2. Pump Station with 10000 l capacity and two pumps
3. Outlet water tank with 18000 l capacity

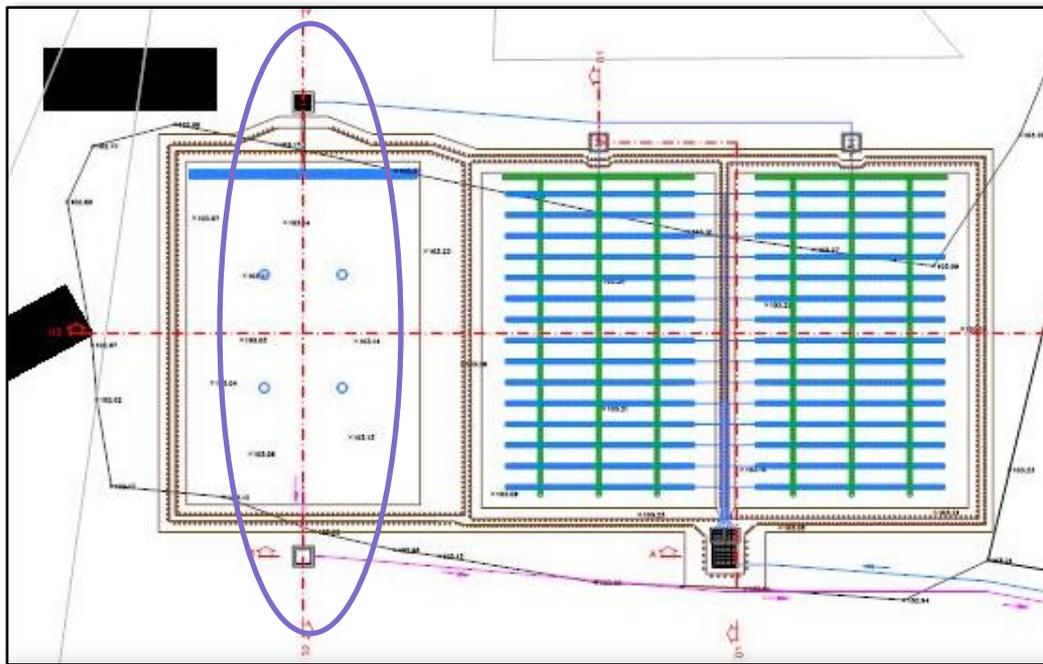
We need to process approximately 20 m<sup>3</sup> of wastewater for day, using two vertical pool, and consequently we'll have 12 periods of irrigation, that'll be 3,2 minutes long, for each pool. Every single pool we'll received a new irrigation after 2 hours. At the head of the two vertical pools there are two butterfly valves with electrical actuator, that manage the inlet flow direction.

Pump specification:  $Q = 10 \text{ l/s}$   $P = 1,05 \text{ kW}$  design head 7,54 m

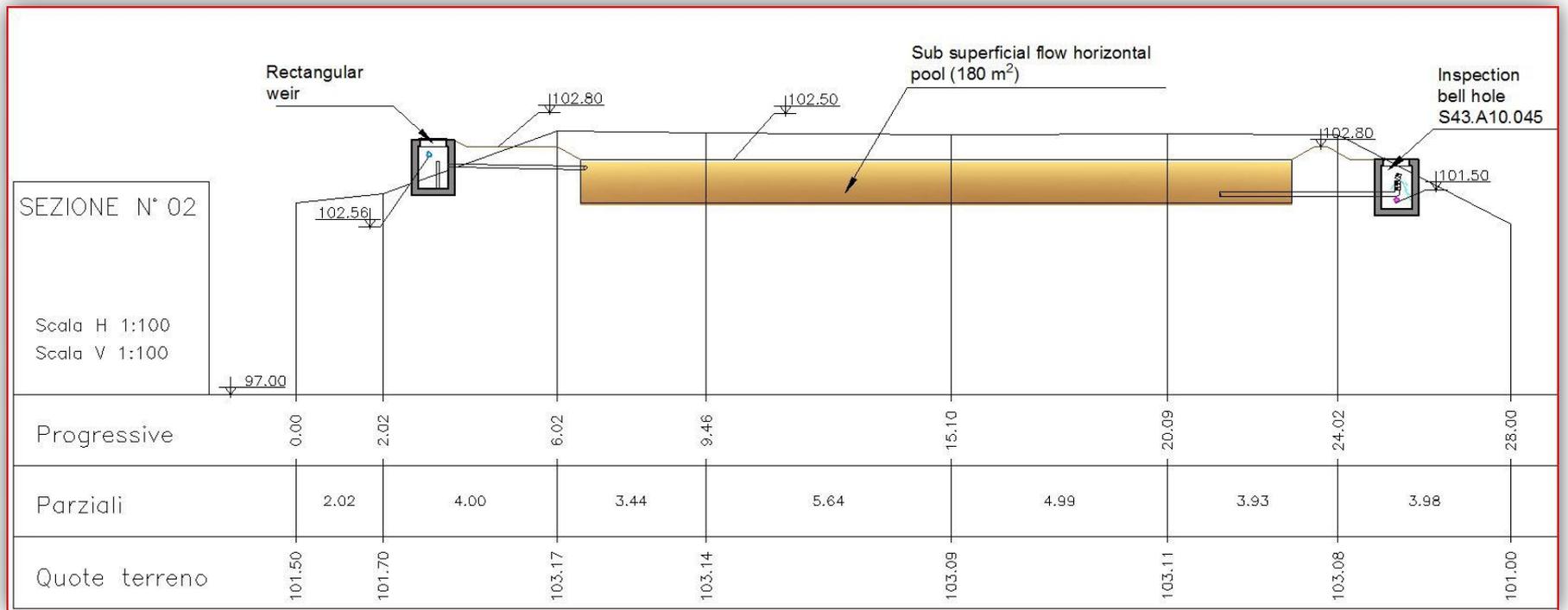


## SECTION OF VERTICAL POOL WITH INLET SYSTEM AND OUTLET BELL HOLE.





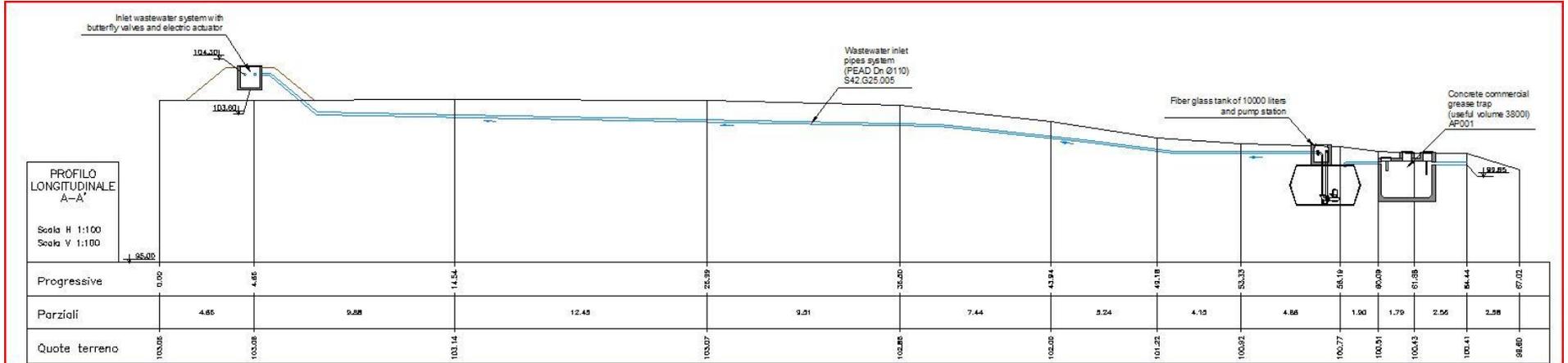
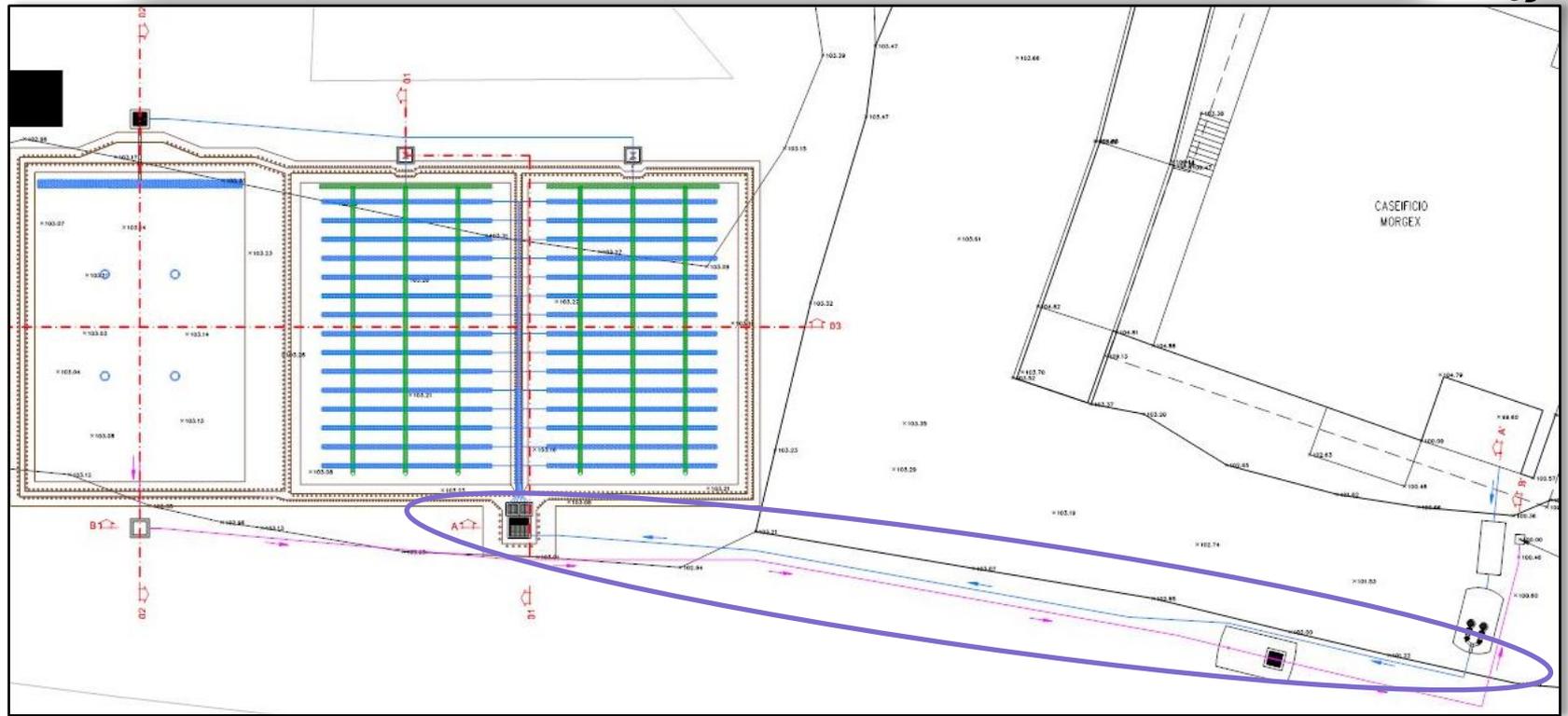
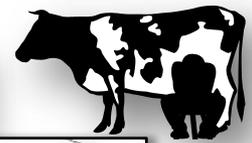
SECTION OF  
HORIZONTAL POOL  
WITH INLET SYSTEM  
AND OUTLET BELL  
HOLE.





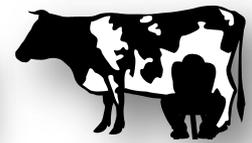


# WASTE WATER TREATMENT



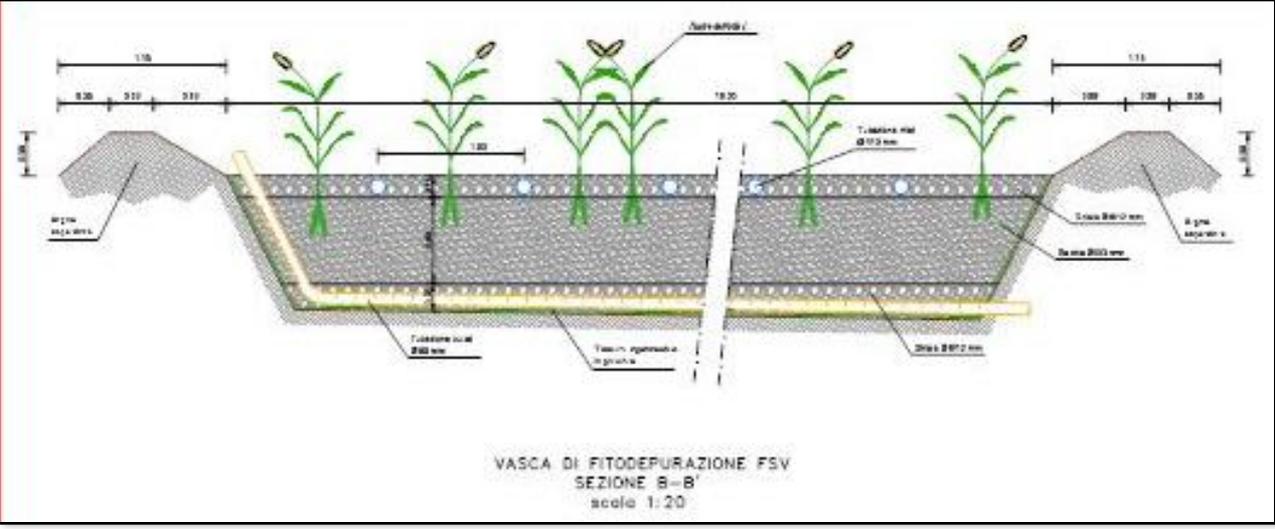


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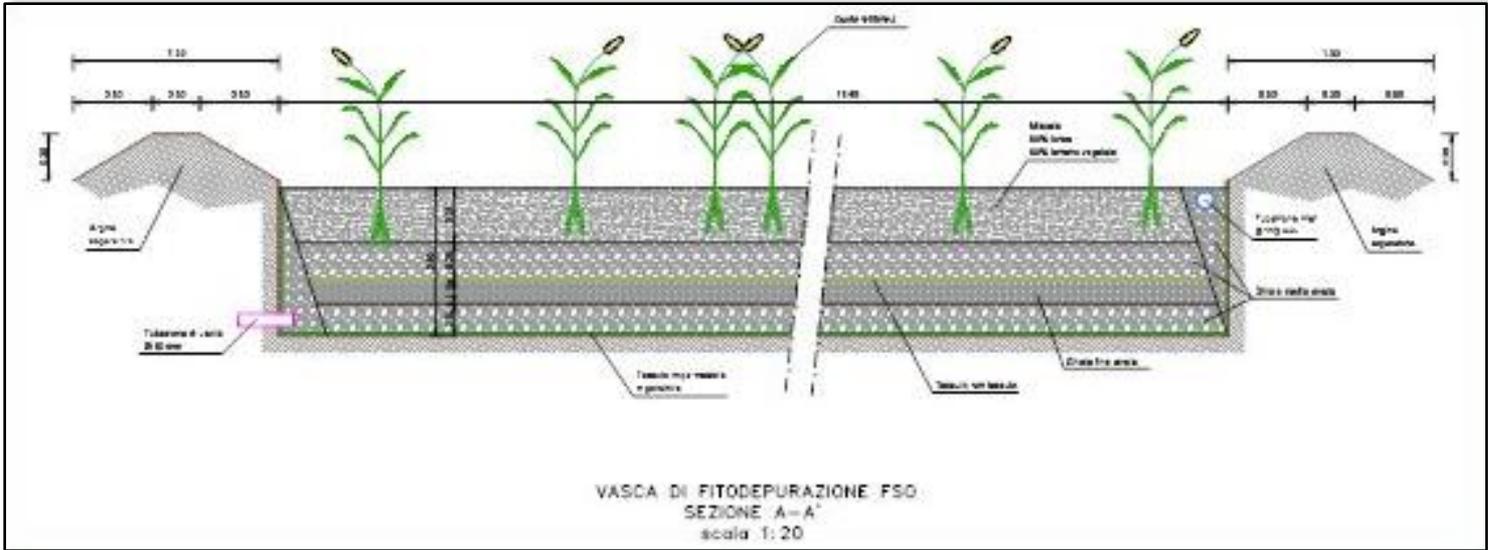


## PHYTOREMEDIATION POOLS FILTER MEDIUM

- Vertical: from the bottom
- gravel 6-12mm
  - sand 0-3mm
  - gravel 6-12mm



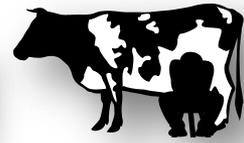
Pools isolation: 0,15m of soft ground, 2mm of technical tissue for mechanical protection, HDPE membrane.



- Horizontal: from the bottom
- gravel 8-16mm
  - gravel 4-8mm
  - gravel 8-16mm
  - mix of 50% peat and 50% soil



## COSTS

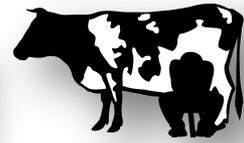


### MOST RELEVANT COST OF THE MAIN ACTIVITES INVOLVED IN THE CONSTRUCTION

Element	Price
Grease trap	~ 4.000 €
Pump station (2 3kW pumps)	~ 4.800 €
Water tank for the pump station (fiber glass, 10.000 l)	~ 3.700 €
Butterfly valves with electrical actuator	~ 750*2 €
Gravel	~ 13 €/ton
HDPE liner	~ 23 €/m <sup>2</sup>
Appliance pannel	~ 2.800 €
<i>Cost of the plant</i>	<i>~ 150 €/m<sup>2</sup> of pools</i>



# PROBLEMS

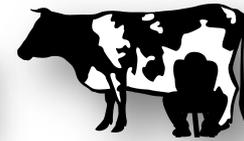


## PROBLEMS AND EXPECTED DIFFICULTES

- 1) The biggest problem it's the climatic situation of the area, in particular for the difficult of proliferation of the phytoremediation selected vegetable species. For this reason we choosed local well known plants.
- 2) Onother problem it's linked with the particular type of work treated inside the cheese factory that produce a flow very rich of fat, that it's extremely dangerous for pipes and conducts.
- 3) The moderate high temperature of the outlet water could be a problem for the right work of the primary pumps, that for this reason will required a more often control.
- 4) The effective space required for the phytoremediation pools are higher then the available space



# WORK IN PROGRESS



## REALIZATION OF THE PROJECT

