4 IRRIGATION BASED LEACHATE TREATMENT

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ABSTRACT

In southern Sweden, several irrigation based on site treatment has been established the last years. Briefly they consist of a pound to storing leachate water with pre-treatment and a system what irrigate vegetation. It could be areas of willow plantations designated for energy purposes or grass or as in same cases spontaneous vegetation.
The use of willow have been studied since 1992. These tests have clearly shown that recycling of municipal wastewater in Salix plantations, can replace a large part of the conventional wastewater treatment, due to natural purification processes in the soil/plant system. During the last few years, several full-scale treatment plants based on the soil/plant system have been set up to treat leachate water from municipal solid waste (MSW) landfills.
One other way to reduce leachate water is to use transpiration. On dry days leachate is pumping and irrigated ideal on top of landfills inside the leachate collection system.
Rosenqvist Mek.Verkstad has developed the irrigation system "RWIS" for distribution of waste and leachate water into the plantation. The irrigation system has to be able to withstand trying conditions, without major maintenance in between harvests.

INTRODUCTION

Special conditions apply to irrigation design for this waters. This requires a system that satisfies the following conditions:

- Potential aerosol leakage must be eliminated.
- Harvesters must be able to move freely, without the system being dismantled (option)
- Low running costs
- Low maintenance costs
- Can be integrated with other water/sewerage systems

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RWIS is a concept based on root zone watering. The technology is a type of controlled flooding, combined with broad irrigation.

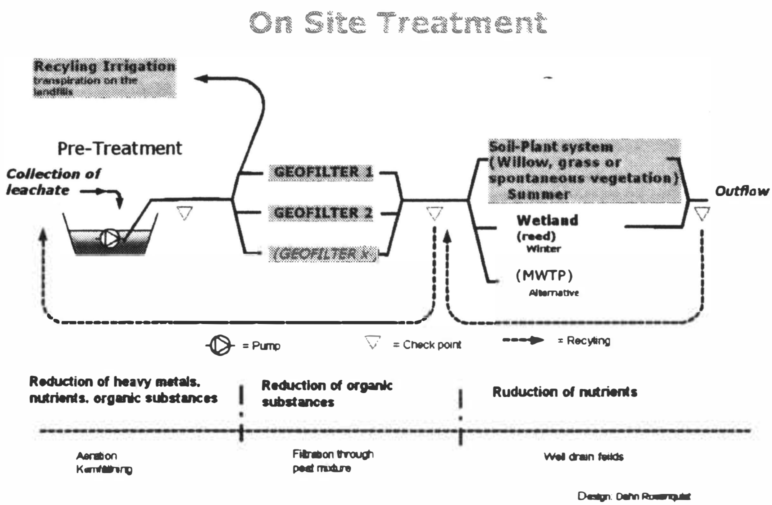

Figure 1. Show where irrigation comes in on a landfill

RWIS

From pre-treatment the water pumped through an underground duct to the willow field. The duct, which can supply one or more fields with water at the same time, is connected to a trunk pipe under the Salix field. Electrically operated valves, one for each module, are mounted on the trunk pipe. The module comprises a trunk pipe (underground) with, on

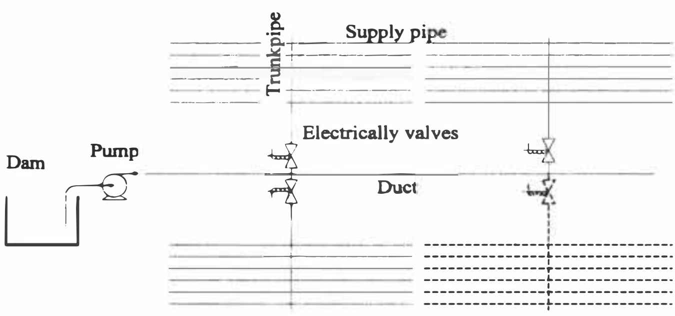

Figure 2. Principe schema RWIS

either side, 12 supply pipes with drilled holes (an arrangement similar to the veins in a leaf). The supply pipes lie on the soil surface. Allowing the water to flow out at ground level, minimises odour and sanitary problems, and avoids the formation of aerosol. By utilising the horizontal transport of water by the soil and by flooding to exploit undulations of the terrain, the distances between the supply pipes can be made relatively large. Salix have long roots (10 metres or more) and will seek out water and nutrients. Experiments in Kågeröd and Bromölla show that the effect on the groundwater is minimal.

Recycling Irrigation

This system is very much like the RWIS system but instead of hols there are sprinkler. Normally used sprinkler is a plastic rotators. This sprinkler have the right combination of radius, uniformity and diffused stream. Depending on climate 20-50% of rainfall is possibly to transpiration. That is recommended to locate the system on the landfill. As the system is very easy to move also temporary arias on the landfill could bee used and also get a possible effect on the landfillgas production.

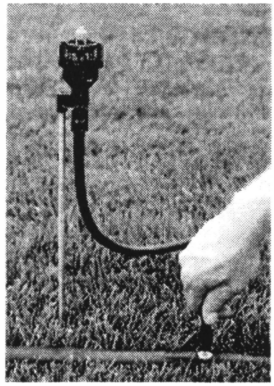

Figure 3 : Rotator R2000

Irrigation amounts

The Kågeröd experiments indicate that an appropriate water irrigation rate is about 6 mm/day, which gives the heights biomass production. Rates up to 12 mm/day have been tested. The reduction of total N was 82-93% , 90-97 % of total P and 74-82% of BOD. The irrigation should follow the vegetative period of the Salix. Normally, the vegetative period begins in May and ends in September-October, depending on the location . Especially towards the end of the period, the nitrogen content should be reduced to avoid frost damage. When designing a RWIS, you must consider what is add with the sewage and removed with in the harvest, to maintain the balance of nutritional requirement.
During the non-vegetative period, the water is held in ponds or treated in a conventional treatment plant. Calculations show that, even with the costs of holding ponds, the plant based sewage treatment method can compete with conventional treatment technology.

Control system

The combination of simple equipment and advanced computer-controlled irrigation gives:

- Optimal growth with maximum nutrient absorption
- Minimal running costs
- Minimal maintenance costs
- Documentation and follow-up

When distributing sewage, it is essential to know where the water goes! This makes demands on the irrigation technology. Using a control system, which takes into account, topography, soil type, sewage quality and external precipitation solves the problem. Information for reporting to authorities is saved and compiled in the system.

There is also an advanced function monitoring system, which minimises the need for maintenance. The control system can be a self-contained unit, or be integrated with the central water/sewage control system.

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