

THE RISÖFLADAN EXPERIMENTAL FIELD FOR CHEMICAL PRECISION TREATMENT OF ACID SULFATE SOILS

by

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This paper presents the experimental field that has been constructed as an integral part of the PRECIKEM (Chemical precision treatment of acid sulfate soils to prevent acid formation) project. This three-year project was launched in late 2010 by Novia University of Applied Sciences, Vaasa University of Applied Sciences, YA! Vocational Education and Training and Åbo Akademi University. The field was planned and its construction was supervised by Pro Agria, the Rural Advisory Centre of Ostrobothnia. The field was constructed by a local entrepreneur, Nybacks Gräv. The ultimate goal of the project is to find and demonstrate applicable management techniques that enable sustainable agriculture on Ostrobothnian acid sulfate soil farmlands while reducing the acid and metal load received by nearby natural waters. Large-scale experiments, based on laboratory-scale experiments, with oxidation-inhibiting chemicals mixed into irrigation water are going to be performed using the Risöfladan Experimental Field in 2012 and 2013.

The field is situated on Risöfladan, an area that not long ago still was part of the nearby sea. Risöfladan was drained and dried in the 1950s by surrounding the area with embankments and by pumping excess water into the nearby Toby å/Laihianjoki river. The area was taken into agricultural use by its owner, the Agricultural School of Korsholm (a predecessor to YA! Vocational Education and Training). The area is still drained by pumps and the ground surface is about 0.5 metres below sea level. Altogether, 9.58 hectares of the Risöfladan area is used for the experimental field. A new drainage system tailored for the project experiments was built on the experimental field in the spring of 2011. A map of the experimental field is presented in Fig. 1.

The experimental field is divided into nine 1-hectare subfields, each with its own drainage system. Each system consists of subsurface drain pipes, a collector pipe and a control well. The average depth for the subsurface drain pipes is

1.2–1.3 m. Each subsurface drain pipe is equipped with a flush pipe that is used for cleaning the drain pipes as well as for remote visual inspection of the drain pipes using an endoscopic video system. Every subfield is surrounded by a plastic sheet that extends from about 0.4 m below the surface down to about 1.9 m. This sheet provides hydraulic insulation between the subfields and between the subfields and the ditches. The only exception is subfield 2, where the plastic sheet between the subfield and the ditch was not installed, in order to provide information about the extent of the natural by-pass flow from the field. In order to also be able to control the water levels in the ditches surrounding the field, dams have been constructed in three places and mobile pumps can be used to drain the ditches and thereby control the groundwater table.

Subsurface irrigation is an important part of the experimental setup. A water pipe has been installed from the Toby å/Laihianjoki river to the experimental field in such a way that every subfield can be reached. By pumping river water into the control wells, the subfields are irrigated from below.

In order to be able to follow the groundwater level, three groundwater pipes have been installed in each subfield. Each of these groundwater pipes reaches down to a depth of 2.5 m below the surface. A liquid level float connected to a rod that is visible above the pipe is used in these groundwater pipes for quick and easy visual observation of the groundwater level. In one of these pipes per subfield, automatic logging of the groundwater level is also used. A fourth groundwater pipe per subfield is shallower and allows for specific sampling of groundwater down to 1.3 metres. A weather station logging temperatures, wind speeds and directions, humidity, and precipitation has also been installed in the field. Furthermore, soil temperatures at depths of 0.3, 0.6, 0.9, 1.2 and 1.5 m below the surface are being followed at four points.

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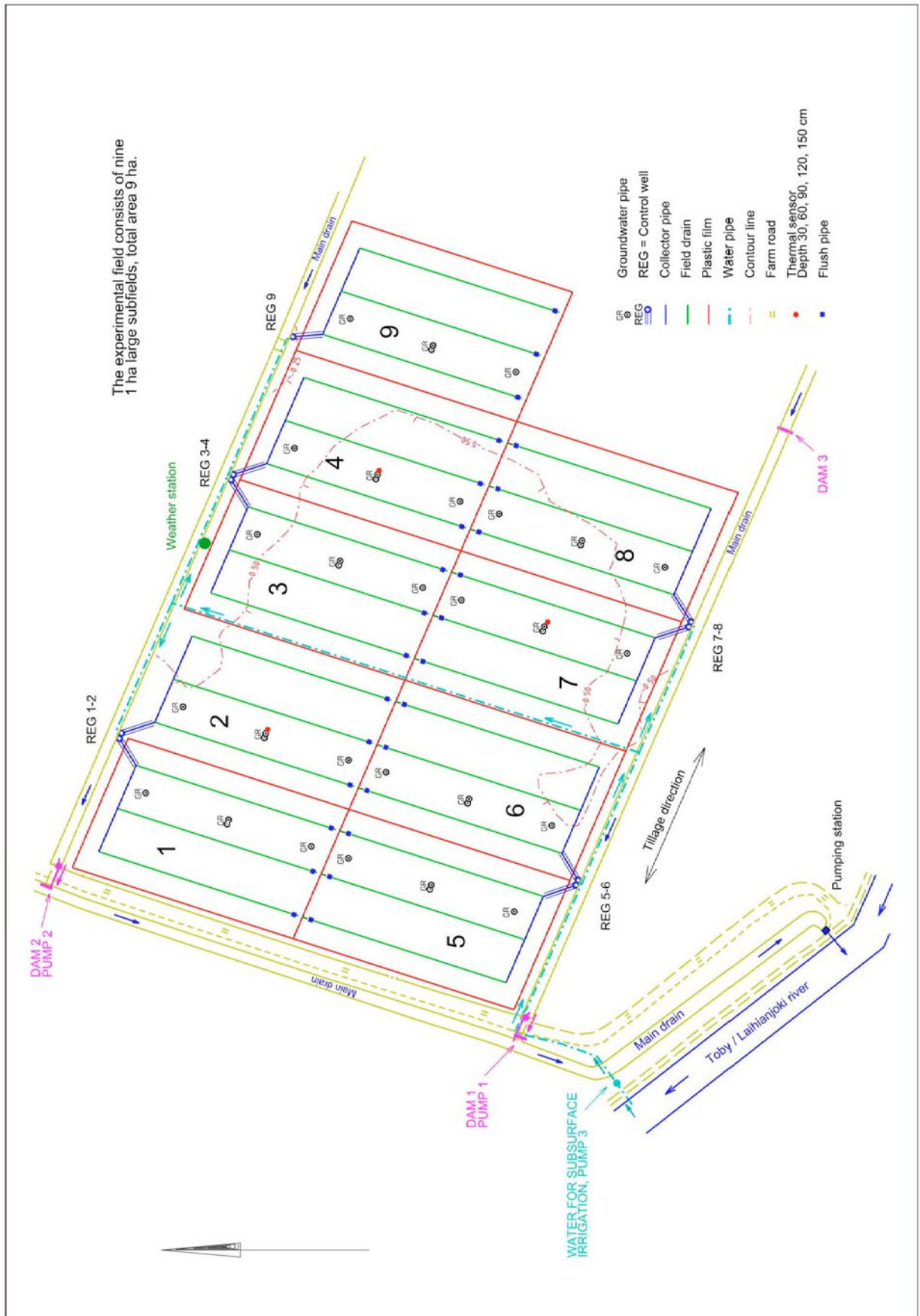


Fig.1. The Risöflad Experimental Field.