measure bulletin

Newsletter for the customers of Labkotec Oy

November 2015

Demanding flow measurements:

The Pasila railway yard was expanded to Ilmala in the 1960s following the closing of the landfill site located there.

Management of rain and drainage water of a railway yard and former landfill

The Pasila railway yard was expanded to Ilmala in the 1960s following the closing of the landfill site located there. Approximately 10 million cubic metres of mainly household waste had been taken to the site over 15 years. As was common in those days, industrial and hazardous waste was also taken to the landfill in addition to municipal waste. The railway yard was grounded without an insulating layer directly on top of the levelled-out landfill site. The procedure was in compliance with the then-current building regulations. Rain and drainage water were led to the nearby Kumpula creek, along which they flowed through the Vallila allotment garden area to the Vanhakaupunginlahti bay.

"Depending on the compaction that has taken place, the waste masses are now at a depth of 1 to 4 metres. The depot area is like a bowl. What does not evaporate or absorb will flow away through the soil. The current volume of the landfill is perhaps only one tenth of the original. The landfill is now in its twilight age soothe formation of methane and other landfill gases has clearly slowed down, so the formation of methane and other landfill gases has clearly slowed down," estimates **Pekka Rikka**, who worked as Project Manager at the Finnish Rail Administration.

Drainage water must be cleaned

For decades the quality of drainage water was a source of constant problems, and oil residues were also detected in the Kumpula creek, which were thought to originate from the VR depot. In 1997, the City of Helsinki Environment Centre urged Helsingin Vesi to connect a rainwater sewer to the rock tunnel sewer leading to the Viikinmäki wastewater treatment plant.

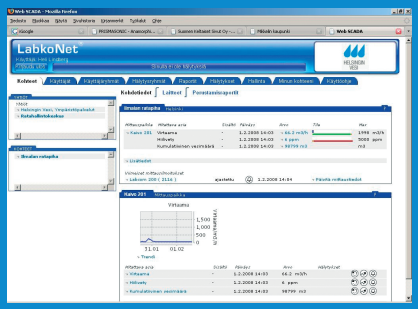
In 2004, Helsingin Vesi decided to start collecting ground and wastewater charges for all water let to wastewater sewers from 'contaminated' areas. An estimate of the flow rates of rain and drainage water was needed for the wastewater charges.

In the spring of 2006, a follow-up project was started to assess the environmental effects of the old landfill with regard to the Ilmala railway yard.

From an estimate to real-time information

Office Manager **Kim Brander** from Golder Associates Oy, a company serving as an environmental consultant for the project, estimates that quite a large portion of the railway yard rain and meltwater will absorb into the soil.

"In addition to the area of the site, the estimate of the amount of water flowing through the rainwater sewer was based



The measuring data is immediately available to all parties via LabkoNet®. Thanks to the versatile connections of the remote monitoring system, the target could be directly added to Helsingin Vesi's LabkoNet® site.

OCM Pro has been specifically developed for the measurement of waste and seepage water.

on the average annual rainfall data and estimated evaporation and absorption volumes," he says.

Consequently, the amount of rain and drainage water of the 60-hectare depot area was estimated to total 665 cubic metres a day on average. Later, it was noted that water also flows onto the railway yard from the nearby Pasila post centre area.

"The estimated daily flow rate was relatively high, which was reflected in the water purification costs charged. Estimate-based invoicing is not fair for either party. We want to know the exact total amount. Additionally, we need exact information about the types of impurities that migrate with drainage water, because seepage water from old landfills often causes problems for wastewater treatment plants," explains **Yrjö Lundström**, Environmental Manager at the environmental services unit of Helsingin Vesi.

Flow rate measurement and water quality analysis

The purpose of the follow-up commenced towards the end of 2007 is to determine the total amount and quality of the railway yard rain and drainage water. A Nivus OCM Pro flow measurement system that also included sampling equipment was installed in the railway yard rainwater sewer. The flow rate measurement is constant, but the water quality is examined with water samples taken four times a year. Water samples are also taken from the ground and perched water observation pipes in the railway yard and from the ditches in the surrounding area.

The load imposed by the drainage water can be calculated based on the flow rate data and quality analysis results. If the water quality can be made such that it could be led back to the Kumpula creek, Helsingin Vesi would only be happy, Lundström thinks.

"The ball is now with the Finnish Rail Administration as far as we are concerned. We expect to receive reliable flow rate data to serve as the basis for a variety of calculations."

Data available to several parties

The measuring data are immediately available to all parties via LabkoNet®. They can be put to use as such. Thanks to the versatile connections of the remote monitoring system, the target could be directly added to Helsingin Vesi's LabkoNet® site through which wastewater carbon and hydrogen sulphide concentrations had already been monitored in pumping stations at ports, etc.

In addition to Helsingin Vesi, information about the railway yard drainage water is also monitored by the Finnish Rail Administration, VR-Group Ltd and Golder Associates Oy, a company serving as an environmental consultant for the project that reports the information about water volumes and quality to the Uusimaa Regional Environment Centre as part of the environmental effects monitoring of the old landfill. Brander thinks that it is possible that an alternative system for processing rain- and drainage water will be designed based on the information collected.

"We have already received readings and at least obtained useful information from them. However, it is too early to assess the results in any greater detail at this point," he says.

The Finnish Rail Administration also wants to determine the amount of water that flows into the railway yard area from elsewhere that is included in the rain- and drainage water it is liable to pay for. The amount of water flowing from the direction of the post centre is measured using a portable Nivus PCM 4 flow meter.

The equipment installations were carried out towards the end of October 2007.

Nivus OCM Pro

The OCM Pro measuring system is capable of simultaneously measuring both the flow rate and the fluid level. The measurement is not compromised by the presence of sludge, solids, fibres, grease, a film forming on wastewater surface or any other adverse circumstances related to the fluid being measured. The measuring device is the most accurate on the market. It has been specifically developed for the measurement of waste and seepage water. OCM Pro is perfectly suited for flow rate measurements in big pipes.

The large data volume makes it possible to obtain a highly accurate view of the fluid flow profile in different times. The display is able to show flow rates even for two weeks.

Up to three sensors can be installed in wide canals where the flow profile in the cross direction may vary. In addition to an integrated level meter, the system can also be connected to external level measurements, such as an ultrasonic radar or a pressure sensor.

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