

OE-FRI1000-1 19V OUTDOOR AND FRILUFT

WATER PROJECT REPORT

Place: Molbekktjernet, Moss, Norway.

Date: March 14th, 2019.

Weather: Actual Temp 2° /-6°; Hist. Avg. 3°/-3°.



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1. The aim of the fieldwork

The aim of this project was to test the water areas that could be affected by the building of the road to transport supplies to the new railroad. The stream is monitored at several points to get control results, how the stream is affected and also how the lake is affected by the building of the road and railway. This project was started before the road was built and was monitored weekly throughout the building process to ensure that the water is not being severely contaminated. After the road was built it was then monitored monthly and will continued to be monitored throughout the demolition of the road to ensure that the water goes back to what it originally was before this project began.

2. Background information

2.1. About the project: "Railway"

The client "The Norwegian National Rail Administration" is building a 10km double-track from Sandbukta in Moss to Såstad (Rygge). And they want to build a new railway station in Moss too. Sweco (plans and designs the communities) is working together with Ramboll. The project should makes is so much easier for passengers to travel on the Østfold Line.

2.2. Short version of what Rambøll is and what their role in the large railway project is

Rambøll is a leading independent engineering, design and consultancy company. The company was founded in 1945 by professors Johan G. Hannemann and Borge J Rambøll. Ramboll have 300 offices in 35 different countries. The company is made up of 15000 employees that are experts in different market areas, such as buildings, transport, planning and urban design, water, environment and health, energy and management consulting. Due to this wide variety of markets Ramboll strives to achieve inspiring and exact solutions to environmental problems.

2.3. About the area of Molbekktjern

Type: Hiking

Length: About 4.5 km

Duration: 1 hour, 30 minutes

Grading: Medium

Fits: Children

Area: Oslo Fjord

2.4. About water

2.4.1. What is water and what important properties does water have?

Water is a colourless and odourless liquid that makes up the seas, rivers and lakes on Earth. Water is made up from an oxygen atom and two hydrogen atoms joining together by covalent bonds. Water can be found in three different forms, these include it in liquid form as water, in gas form as water vapour and as a solid as ice. 97% of the water on Earth is saltwater which means that it is not suitable for drinking and agriculture. Although the remaining 3% of water is freshwater, most of this is trapped in glaciers and only 0.3% is surface water.

Water has many important properties and these include:

- It is a universal solvent, which means that many substances can dissolve in it.
- It is cohesive and adhesive
- It has a high surface tension which enables insects to walk across it.
- It has a high heat capacity, this means that water can hold a large amount of heat and because of this it takes a long time to warm up and a long time to cool down. This makes it a stable environment for wildlife to live in as temperatures do not fluctuate rapidly, and stabilises body temperature in humans.
- It changes in density. Water changes in density due to temperature and salinity, and is most dense at 4°C and is least dense 0°C.

(Science Learning Hub, 2019)

Water is	This is important for life because
A powerful solvent	It allows and facilitates chemical reactions, making it a good medium for molecular process necessary for life
In a liquid state at most temperatures on Earth	Is it an unique property, no other common substances on the surface is liquid
Highly stable, resistant to changes in temperature and resists change between states	It allows life to exist in many different temperatures and facilitates homeostasis
Buoyant and viscose	It exerts selective pressure on aquatic organisms, reduced in support systems
Less dense as a solid	Ice floats, allowing bodies of water to remain liquid below surface ice

2.4.2. Explain the water cycle

The atmosphere contains water in gaseous form (i.e. water vapour). This proportion is increased by the evaporation process. Water in gaseous form rises from the earth's surface (e.g. from lakes and oceans) and water droplets are formed, which can be held in the atmosphere in the form of clouds or transported over long distances by the wind. After reaching a certain



drop size, the water returns from the atmosphere to the earth in the form of solid or liquid precipitation (e.g. snow, hail, rain).

There a part can be stored in the form of snow or ice, evaporate again, seep away or enter the next river and again reach the sea after a certain time delay (surface runoff).

The infiltration process first fills the soil water reserves. Plants need this soil water in order to absorb the water with their roots and then transport it to the leaf surface where it can evaporate again (transpiration). If the water now penetrates further into the soil, it reaches the groundwater for new formation.

If the surface, intermediate and groundwater runoff reaches a stream or river, it follows the greatest gradient to the sea or lake and is thus available to the circulation system again. However, the highest water conversion takes place on the sea. Most of the evaporated water returns to the sea as precipitation.

Depending on the size of the reservoir, the water needs a different turnaround time to renew the entire volume of this reservoir.

- Water in atmosphere = Every 9 days
- River water = 12-20 days
- Lakes = days to centuries (depending on depth, area & drainage rate)
- Oceans = approx. 3100 years

3. Methods used in the fieldwork

3.1. What methods were used, what samples were taken

- They used a "Combination measuring instrument". This tool can measure many different things:
 - 1. The temperature
 - 2. The PH value
 - 3. The TDS (Total Dissolved Solids)
 - 4. The Salinity
 - 5. The Conductivity



- We took the samples from different places. One point was downstream of the creek, one point was upstream and one in / close to the lake
- Our group was taken the first sample downstream.
- We also filled up a glass bottle with the water from the lake to bring it later to the laboratory, where they are going to do more measures. Another water sample was filled in a bottle where acid was inside.

3.2. Why were the sample taken. Describe each method and what the sample measured.

The samples were taken to monitor the water quality. They want to know if the construction changes anything in the environment.

	1.Point	2.Point	3.Point
Temperature °C	0.6	0.3	1.0
РН	6.7	6.9	6.3
TDS {mg/l}	49.1	71.6	-
Conductivity uS/cm	68.2	100.6	77.5
Connectivity	0	0	0

3.3. Why are these samples required?

It is important to see if something changes in the water, because it can have bad influences to the ecosystem. It is necessary to observe the area before starting the construction, during it and after finishing it. The aim is that in the end the water quality is the same as before.

Link to our videos:

Documentation: https://wordpress.usn.no/228239/wp-content/uploads/sites/275/2019/03/Documentation.mov

Interview with Tom: https://wordpress.usn.no/228239/wp-content/uploads/sites/275/2019/03/Ramboll.mov

Password: outed

4. References

Molles M. & Sher A. (2019). Ecology - Concepts & Applications. McGraw-Hill Education: New York.

SWECO. Intercity: Safer Railway Development with BIM, (n.d). Retrieved March 20, 2019, from: https://www.sweco.no/en/projects/intercity-sandbukta-moss-sastad/

Water density. (2007, July 19). Retrieved March 21, 2019, from <u>https://www.sciencelearn.org.nz/resources/1009-water-density</u>