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Task B, 1st delivery: List of operational parameters to be monitored at each of the 3 facilities

The purpose of the monitoring program is to document the treatment performance of the 3 wet ponds with respect to the removal of gross solids, nutrients, heavy metals and organic micropollutants. The results are furthermore used to compare the operation of the facilities with other Best Management Practices (BMPs).

The methods by which a parameter is monitored are:

1. Continuous measurement by electronic monitors
2. Flow or time proportional sampling
3. Periodically performed measurements

1. Parameters to be continuously measured

To establish the overall mass balances needed to assess the pond performances, each pond will be equipped for continuous measurements of flow and precipitation. In addition hereto, a number of physico-chemical parameters are measured in each pond, in order to continuously assess pond performance.

Parameters to be monitored:

- Inlet flow
- Outlet flow
- Precipitation
- Temperature in the air
- Temperature in the pond
- pH in the pond
- Dissolved oxygen in the pond
- Turbidity in the pond

2. Parameters to be measured by time or flow proportional sampling

Water quality parameters in the inlet and outlet are continuously sampled throughout the monitoring period. The samples are lumped and analysed with suitable intervals. It is intended to cover as much of the total inflow and outflow as technically possible.

Gross parameters

During runoff events, large amounts of organic and inorganic material are washed off from the urban surfaces. To assess the overall amounts of matter entering each pond, the solids concentrations and organic matter concentrations are measured.



Parameters to be monitored:

- Total suspended solids (TSS)
- Volatile suspended solids (VSS)
- Chemical oxygen demand (COD)
- Total hydrocarbons

Nutrients

An adverse effect of stormwater runoff is discharge of nutrients, causing eutrophication of especially ponds, lakes and shallow coastal waters. In this respect, especially phosphorous is a problem, however, in some cases nitrogen also contributes to the problem.

Consequently the following parameters are going to be monitored in inlet and outlet of the facilities:

Parameters to be monitored:

- Total phosphorous
- Ortho phosphate or reactive phosphorous
- Total nitrogen

Heavy Metals

Heavy metals have a toxic effect on the receiving water ecology, and literature studies show that especially zinc, copper, lead and cadmium are critical parameters; however, also nickel and chromium are reported as being problematic.

Parameters to be monitored:

- Zinc
- Copper
- Lead
- Cadmium
- Nickel
- Chromium

Organic micropollutants

Pesticides

The number of possible pesticides in runoff water is legion. The selection and the number of pesticides will depend on the actual catchment, and the actual pesticides to be monitored will therefore be selected based on initial screening. The screening will include between 30 and 60 pesticides. Based on literature study of similar catchments, it is expected that between 2 and 6 characteristic pesticides will be present in significant concentrations and therefore selected for continuous monitoring.

PAH

Polyaromatic hydrocarbons are found in the exhaust of vehicles and literature study has shown PAHs to be an important pollutant in stormwater runoff. Not every PAH does, however, occur in all catchments, and PAHs are therefore measured as total PAHs as well as individual PAHs selected by an initial screening for the most significant components.



Parameters to be monitored:

- Total PAH (the sum of 16 different PAHs)
- 2-3 specific PAHs will be selected based on initial screening

Phthalates

Phthalates are plasticisers produced in the catchment by e.g. vehicles. They are known to be found to different degrees in stormwater runoff.

Parameters to be monitored:

- 2-3 specific phthalates with different polarity and thereby different physico-chemical behaviour will be selected based on initial screening

3. Periodically measurements performed in the pond

Specific parameters are measured based on grab samples. The measurements are needed for different reasons. Some (sulphate, chloride, carbonate, alkalinity, total coliform and faecal coliform) are needed to assess the general level of these parameters in the ponds. Others (total iron, total aluminium, chlorophyll-A and Secci depths) are needed to assess the performance of the pond and to calibrate continuous measurements.

Parameters to be monitored:

- Sulphate
- Chloride
- Carbonate
- Alkalinity
- Total coliform
- Faecal coliform
- Total iron
- Total aluminium
- Chlorophyll-A
- Secci depth

In addition hereto the rooted plants (macrophytes) are monitored for accumulated pollutant uptake.