The Mill Race Biology

—

Landscape-Urban Competition

“Revitalization of the Mill Race in Košice”

Contents

I. Introduction

Revitalization of the Race Mill needs to emphasize the creation of conditions for development of the habitat in water, on the banks and in its surroundings. This document summarizes the basic principles that must be respected in order to achieve these objectives.

II. Basic principles to ensure biodiversity development

1. Biodiversity (fauna and flora)

The overall solution must support reproduction of animals and a self-renewal of valuable vegetation. Specific composition of riparian vegetation and vegetation of shallow zones in appropriately selected places, supports the development of all forms of life and ensures the continuity of food chains: noble microbial life forms - ciliata - aquatic plankton - plants - insects - amphibians - fish - birds - mammals.

Adequate representation of the widest possible range of animals and higher plants (macrophytes) makes it possible to maintain spontaneous ecological stability in the aquatic environment and to control the spread of algae and cyanobacteria above a beneficial level.

Spontaneously functioning habitat has great educational and recreational value. The most important for biodiversity maintenance is the creation of favorable conditions for macrophytes in water and on the banks.

2. Self-cleaning processes in the aquatic environment

The basic means of self-cleaning processes is the support of a diverse representation of macrophytes (aquatic and swamp plants), which ensure the oxygenation of water and depletes excess nutrients. Oxidation taking place in aqueous solution helps to form insoluble substances and sedimentation of the sludge. The roots of plants deplete excess nutrients, especially nitrogen and phosphorus, and bind them by forming their own biomass.

Thanks to the processes of biogenic decalcification linked to the activity of plants, a stable pH is maintained in the aquatic environment, which is one of the basic characteristics of a stable

aquatic habitat. Adequate population of aquatic plants provides oxygen for life in the water and favorably affects the heat and light balance in the water column and also regulates critical overheating of water in summer and prevents oxygen deficiency. One of the strategic solutions is the construction of a sludge removal zone with a root cleaner in the upper course of the Race Mill.

Basic requirements for the creation of a biological water treatment zone (BWT zone):

1. To create in the upper part of the stream (in the vicinity of the bridge over Hlinkova Street) a sufficiently dimensioned modification of the riverbed supporting the development of diverse aquatic macrophytes. The recommended length of such a modified part of the riverbed is at least 55 meters.

2. To enable service handling of the water level (emergency and seasonal), including respecting the need for occasional complete discharge of water from the riverbed and, conversely, retention of water in the riverbed above the BWT zone in case of temporary interruption of water supply from the discharge facility.

3. Adequate swelling of the water level above the BWT zone is possible in the section before the first line of houses at the Mill Race riverbed.

4. The treatment is intended to support water overlaying, meandering and disruption of line flow. It is desirable to alternate deeper zones to allow sedimentation of sludge with belts across the water flow and streaming in the shallow zone of aquatic plants. It is convenient to prepare conditions for rational sediment removal from deep zones and seasonal maintenance of the plant stand.

5. In addition to the BWT functionality, plantings in the riverbed must also meet aesthetic expectations

6. The composition of plantings in terms of the range of plant species should also reflect efforts to support native vegetation species, but must at the same time respect ecological

and climatic burdens in the urban environment. Therefore, appropriately used introduced and bred species with exceptionally suitable characteristics are also allowed.

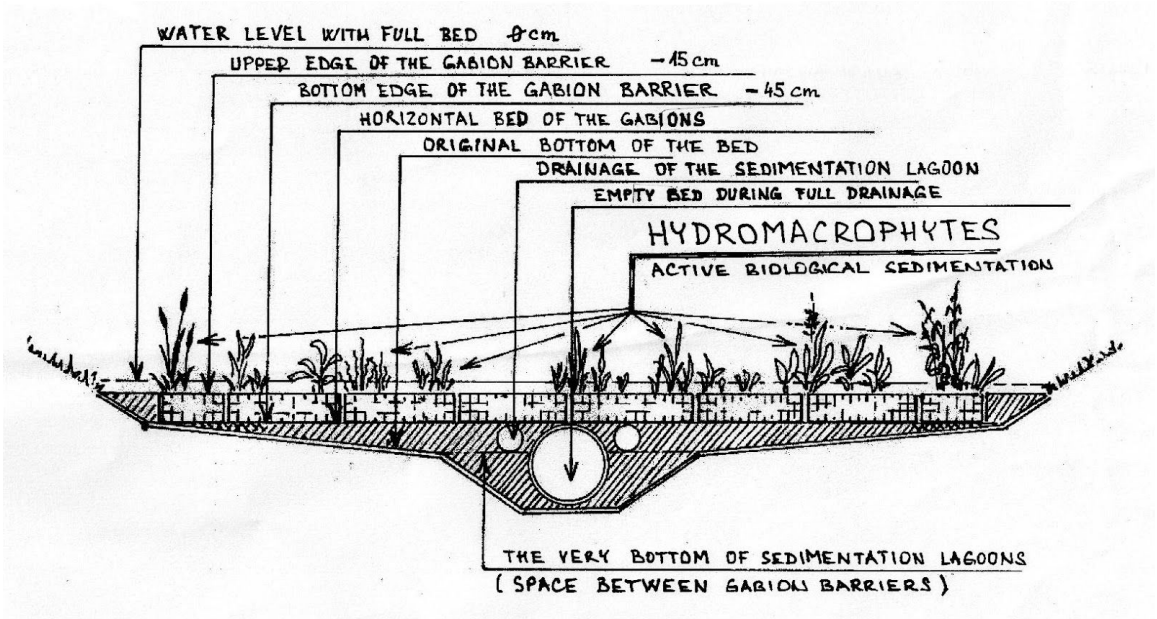
7. The BWT zone will also include solutions supporting the development of fauna (hatching of fish and amphibians, nesting of birds, watering of animals, shelters from predators, wintering, etc.).

8. Barrier-free in terms of organism migration.

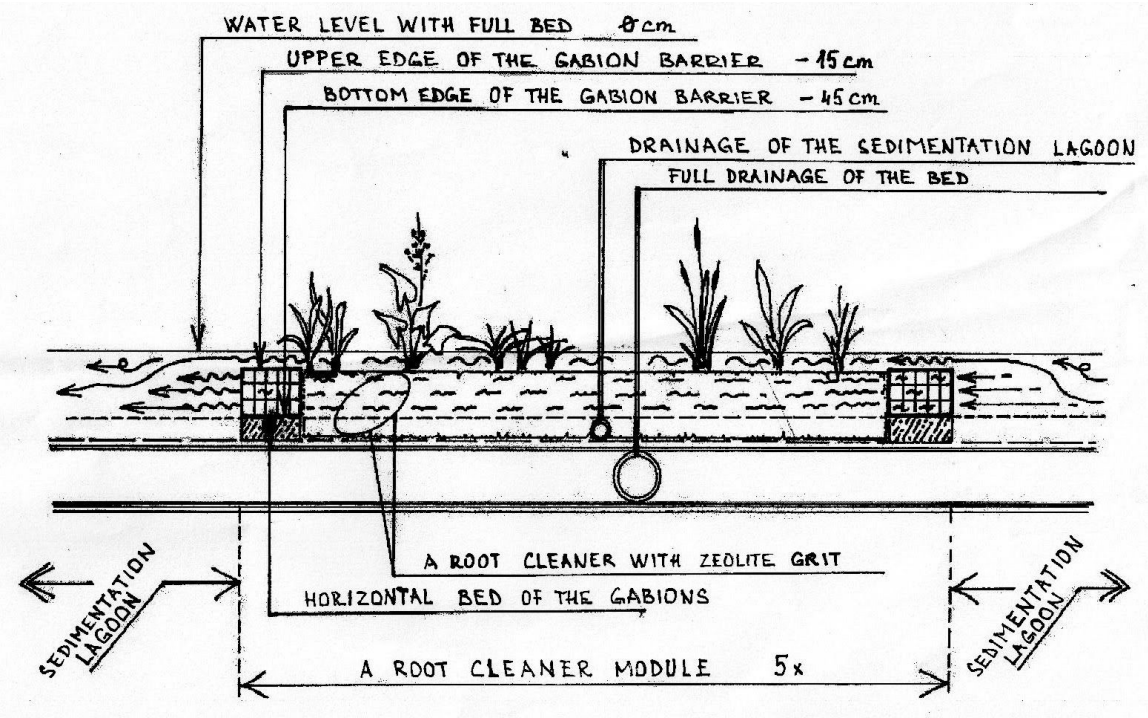
9. Safety of humans as well as animals. .

10. Meeting other essential operational requirements in terms of maintenance, transport, movement of pedestrians and cyclists, maintaining the cleanliness of the environment. It is not excluded, within this busy area, to set up a place of short observation for people from the transport hub, and for people to rest - passers-by pedestrians and cyclists, or guests from the adjacent traffic.

An example of a possible solution is outlined in the following sketches:



Transverse view



Longitudinal view

3. Conditions for water life

The bottom and banks of the Mill Race, now constructed of concrete panels, need to be adequately diversified. These are mainly islets, flowerpots with vegetation, root cleaners, or a tree trunk lowered into the water and fixed on the shore, or a section with a gravel bottom, all these will provide shelter for many organisms. At the same time, shallows and small bays can be created thanks to which the watercourse can come to life.

4. Animals migration

All solutions must take into account the need to maintain the migration of organisms. This applies in particular to the possibility of migration between the surrounding water features in the country and the area itself. Attention must be paid to individual weirs, elevation of levels and the form of separation of Mill Race individual sections so that the possibility of safe migration of all forms of animals, including amphibians, is preserved. Great emphasis must be

placed on solutions for year-round respect for the interests of fauna and possibilities of seasonal migration.

Example 1: Green toad: Spring return of adults from the wintering grounds to the water, laying eggs and preserving the possibility for adults to leave the water after laying eggs, or migrating out of the water to the surrounding country for individuals after the completion of the developmental phase of the gillnet.

Example 2: Amphibians living all year round in the aquatic environment need a background for the real possibility of survival for the accumulation of heat in the sun, shelter and escape from predators, nooks with shallower water, shadowy places for the development of the youngest developmental stages. It is therefore necessary to pay special attention to weirs (difference in water levels with a reasonable elevation of up to 30 centimeters), piped parts, gratings, underpasses, shafts and overcoming roads.

5. Safe nesting of wild birds

The requirements for adequate environment for safe nesting of wild birds are specific and very different according to individual species: tall trees, cavities, shrubs, coastal vegetation, protected places at ground level. An ideal alternative is to integrate nesting sites into water-suitably separated areas - islets. This creates places for safe access to water.

6. Safe access to a suitable form of water for insects

Many species of ecologically important representatives of insects need to receive water in a specific form from shallow and overheated places. On flowing deeper water at normal temperatures, many species of insects cool down, brittle and drown, such as the honey bee. Therefore, in convenient places, it is necessary to create these special mission shallows with alluvium or other treatment.

7. Drinkers and bathing sheds for small birds

Drinkers and bathing sheds for small birds must be located in well-arranged places so as not to create conditions for the decimation of the songbird population by their predators. Shelters for hunting predators should not be located in the immediate vicinity of drinkers.

8. Prevention of birds accidents

Prevention of injuries to birds on transparent surfaces and other technical elements. These are mainly glass and other fillings, transparent surfaces, overhead lines, wires, nets and the like. Create a barrier for birds from trees and tall greenery to avoid traffic collisions.

9. Collection and infiltration of rainwater

It is important to create opportunities and preconditions for solutions that allow for local containment and infiltration of rainfall. Collection of rainwater in seepage lagoons, preparation for the expected discharge of rainwater from surrounding buildings and paved areas into these lagoons and subsequent discharge of excess unused major precipitation directly into the watercourse - see a simple schematic drawing.

10. Primary mission area division

Roads of various types and designs and with a precisely defined function, zoning of green areas according to the intensity of recreational use and maintenance, division of all shore zones and assignment of these identified places to the model solution in accordance with the defined function. Design of the program content for the most important areas in the vicinity of the Mill Race so that, among other functions, ecological interests are respected.

When designing bank modifications, it is necessary to preferentially use the form of concentrated planting of ground cover shrubs, which gives a suitable choice to rationalize future maintenance, avoid future irrational manual maintenance and thus financial costs with a suitable selection of naturally compacted cultivars. Rationally based thickened deciduous shrub plantings offer the possibility of aesthetically impressive, operationally advantageous and at the same time ecologically valuable solutions.