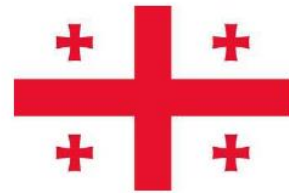




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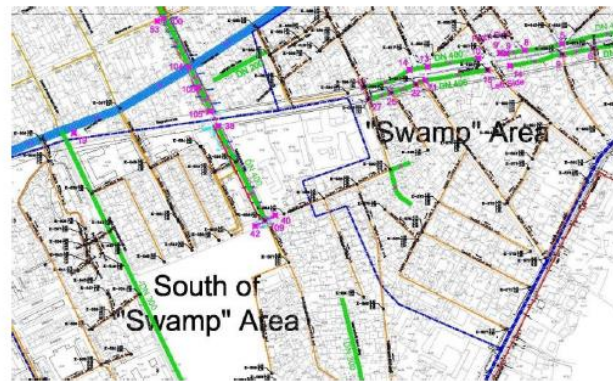
# Rehabilitation of Municipal Water Supply & Wastewater Infrastructure in Batumi – Phase III

Georgia Municipality of Batumi – German Financial Co-operation with Georgia

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Final Design Report - Sewerage

Version 2



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## 6.5 Recommended Option: Rotating Biological Contactors (RBC)

As the land requirements for the implementation of constructed wetlands are out of scale, particularly considering Area C, the Consultant investigated to identify another treatment option that would result in (at least) comparable effluent qualities while saving land. A prerequisite was that the process operates stable, with limited operation and maintenance requirements and that the concept can be amplified and is sustainable.

The biological treatment process based on rotating biological contactors was identified as a suitable solution.

The advantages of the process are:

- low energy consumption
- reliable operation at minimum expenditures for maintenance
- no process engineering required
- optimal biological regeneration due to open and easy to control surfaces
- Bearings and axles are located above water level thus all parts of the discs are exposed to oxygen
- Simple and stable to operate, limited supervision requirements.
- Compact design in order to save space
- The system is composed of modules. An extension of the plant (as well as an increased treatment efficiency with regard to N- and P-removal) can be achieved by adding further modules

In the factory, the modules are composed based on the demands. The rotating disks as well as the clarifier are housed in a case made of polypropylene with a glass fibre reinforced plastic roof. The dimensions of the casings are adjusted to the sizes of standard containers to ease shipping / transport.

### 6.5.1 Process description of Rotating biological contactors

The biological wastewater treatment is based on the fixed biofilm technology.

The process consists of large diameter plastic media (diameter between 2-3 m) centred around a horizontal shaft, mounted in a tank/trough.

The shaft is aligned with the flow of wastewater so that the discs rotate at right angles to the flow with a number of packs being combined to make up a treatment train, depending on the amount of wastewater to be treated. The water is lifted into the biological compartment with the help of a bailing plant. A further bailing plant lifts the treated effluent into the final clarification compartment.

Once exposed to the wastewater a biological growth begins to develop on the plastic media using the contaminants in the effluent as their food source. As the RBC slowly rotates, the media with biomass growth will continuously come out of the wastewater with each rotation of the shaft.

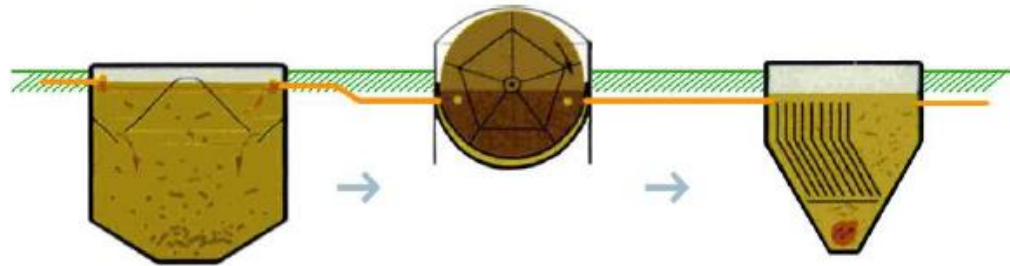
About 40% of the disc surface is permanently out of the water.

During rotation, the media carries the biomass and a film of wastewater into the air where oxygen is absorbed. The dissolved oxygen and organic materials in the wastewater diffuse into the biomass and are then metabolized.

Excess biomass shears off at a steady rate as the media rotates. These solids are carried through the rotating disk system for subsequent removal in the clarifier / final clarification unit.

Rotating biological contactors usually consist of 2-4 sequentially arranged rollers in separate troughs (cascade arrangement). The cascade type of construction enables the realisation of various surface or volumetric loadings and carrier material packed to different densities. Then, on each roller, there is another growth to be found corresponding with the degree of pollution of the wastewater. In addition, cascades reduce the effects of loading peaks.

Figure 15: General Scheme of a Rotating Biological Contactor (Pre-treatment – Biological Treatment – Final Clarification)



### 6.5.2 Layout Considerations:

The WWTPs will be located on a plot of free land located between the housing blocks and the receiving water body. The foreseen locations are marked in the overview maps, see Volume 2 – Drawings

The plant will consist of the following components:

- Connection chamber to sewerage pipe, in-situ construction
- Pre-treatment (in-situ construction)
- Biological treatment based on rotating biological contactors (pre-fabricated elements to be mounted on in-situ concrete foundation)
- Final clarification (pre-fabricated element together with RBC)
- surplus sludge pumping station (included in pre-fabricated element)
- inspection chamber prior to discharge of effluent into receiving water body, in-situ construction

The land requirements can be restricted to the following:

Table 34 : Land requirements of RBC plant

	Area A	Area B	Area C
Minimum area required for preliminary treatment	< 20 m <sup>2</sup>	< 35 m <sup>2</sup>	< 55 m <sup>2</sup>
Minimum area for RBC and final clarification	16 m <sup>2</sup>	26 m <sup>2</sup>	67 m <sup>2</sup>
Resulting theoretical minimum total Area, considering distances between the units	45 m <sup>2</sup>	90 m <sup>2</sup>	130 m <sup>2</sup>

In the following, some pictures are included to show the delivery and installation of such a pre-fabricated unit, as an example