Constructed Wetland Vidrare

29.04.2011, Sofia
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Summary

- Situation in Vidrare

- Realisation of a wastewater treatment for the Centre of Handicapped People

- Photo's of the construction
Introduction OtterWasser GmbH

- **Urban drainage and wastewater**
  - for rural areas (constructed wetlands, pond systems etc.)
  - for urban areas (activated sludge systems)
- **Simulation of wastewater treatment plants**
  - optimisation of the operation
- **Integrated technologies**
  - source separating systems
- **Projects outside the european community**
  - adapted technologies to local conditions
  - dry toilet systems
Wastewater Treatment, Vidrare

Situation in Vidrare

- gutter and creek with waste and wastewater
- problem with odour/smelling

- pilot project together with the municipality of Pravets/WECF/EcoWorld/Handicaped centre/ state administration Sofia Oblast

- Foundation of DBU
Decision process

- **Basic conditions:**
  - Existing sewerage on the ground: The pipes from the main building and the laundry leaves the buildings in direction of the street
  - Slope of the yard
  - Available space: parts of the yard of the Home
  - Existing sewerage, gully and river as receiving water
Decision prozess
Decision process

More basic conditions:

- People living in the Home: maximum 95 beds
- Measurement of the needed drinking water was made before the design: measured volume 8.5 m³/d (while measurement, several beds are not occupied)
- People working in the Home: 2 shafts with 25 employees
- Estimated volume of wastewater: 11 m³/d (all beds are occupied)
Decision process, conclusion

- About 400 m² are available in the yard
- Treatment plant is needed with easy operation and maintenance
- Low energy consumption is wanted
- No danger for the inhabitants of the home

Advantages of constructed wetlands

<table>
<thead>
<tr>
<th></th>
<th>constructed wetland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy demand</td>
<td>low</td>
</tr>
<tr>
<td>operation/maintenance</td>
<td>low</td>
</tr>
<tr>
<td>needed area</td>
<td>large</td>
</tr>
<tr>
<td>costs</td>
<td>low</td>
</tr>
<tr>
<td>sludge management</td>
<td>primary sludge has to be disposed</td>
</tr>
</tbody>
</table>
Decision process, timescale

Agenda of the project

- looking for the surrounding of the handicapped centre and first idea, which treatment will be the best (March 2009)
- detailed planning and first drawing (summer/autumn 2009)
- Meetings with the municipality, explanations of the technics
- technical description for the allowance of the discharge of the water administration (spring 2010)
- Competition for choosing the constructing company (Summer 2010)

- Start of construction in Nov 2010

- Finished in April 2011
Wastewater Treatment, Vidrare

- Constructed wetland
  - primary clarifier
    - Settling tank
  - biological treatment
    - constructed wetland

- discharge/effluent
  - according to the European directives
- sludge treatment
  - treatment in municipal wastewater treatment plant
Wastewater Treatment, Vidrare

- Constructed wetland, scheme:

- pre-treatment
- planted soil filter
- effluent
- pumping shaft

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- Design for Vidrare
**Wastewater Treatment, Vidrare**

- **Design for Vidrare**

  - different estimated loads in comparison to wastewater from households
  - incoming load: 76 p.e.
  - incoming hydraulic load: 95 p.e. (calculated acc. to bulgarian guidelines)
  - pre-treatment: size depends on the hydraulic load
  - biological step (planted filter bed): size depends on the spezific load of the number of inhabitants

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Wastewater treatment plant, Vidrare
Primary clarifier

- Settling tank: 18 m³, including pumping shaft
Small wastewater treatment plant
Primary clarifier

- Settling tank: 18 m³, including pumping shaft
Wastewater treatment plant, Vidrare
Biological (second) step

- planted soil filter, 266 m²
Wastewater treatment plant, Vidrare
Biological (second) step

× planted soil filter, 266 m²

sand

gravel
upper layer

drainage layer
Wastewater treatment plant, Vidrare
Biological (second) step

- planted soil filter, 266 m²
Wastewater Treatment, Vidrare

- Control shaft and outlet to the gutter
  reuse of the existing effluent shaft
Wastewater Treatment, Vidrare
Residual materials

- **Sludge treatment**
  - Primary sludge
    settling tank: sucking van needed, controlled disposal

- **Planted soil filter**
  - plants have to be cut in autumn, the reed can be composted
  - the sand has to be exchanged or washed if the soil filter is blocked
# Wastewater Treatment, Vidrare

## Operation and Maintenance

<table>
<thead>
<tr>
<th>Task</th>
<th>Daily</th>
<th>Weekly</th>
<th>Yearly</th>
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</thead>
<tbody>
<tr>
<td><strong>General tasks</strong></td>
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<tr>
<td>General function control of the technical parts (warning device, control lamps)</td>
<td></td>
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<td>x</td>
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<tr>
<td>Operation diary</td>
<td>x</td>
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<tr>
<td>Record water consumption</td>
<td>x</td>
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<tr>
<td><strong>Treatment plant</strong></td>
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<tr>
<td>Pipes and manholes</td>
<td>1x</td>
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<tr>
<td>Emptying the settling tank (pumping out the sludge)</td>
<td>2x</td>
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<tr>
<td>Visual inspection of the surface of the constructed wetland (plants, weeds, dry zones, water on the surface et al.)</td>
<td>x</td>
<td></td>
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<tr>
<td>Function control of the pumps</td>
<td>12x</td>
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<tr>
<td>Visual control of the discharge</td>
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<tr>
<td><strong>Maintenance</strong></td>
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<tr>
<td>Pumps</td>
<td>1x</td>
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<tr>
<td>Analysing a sample of the effluent (frequency depends on the regulations of the water authority)</td>
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**Constructed Wetland for Vidrare**
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Costs

Investment costs
- Excavation and pipes
- Drainage pipes inkl. fittings
- Filling of the constructed wetland
- Costs for design and applications

Running costs
- Personnel (1.5 h/week)
- Energy supply (ca. 2 kWh/d)
- Sludge disposal
Wastewater Treatment, Vidrare

Thanks to all the people who helps to realize this pilot project in Vidrare