Constructed wetlands, stormwater treatment and sludge composting by reed beds at sewage treatment plant Lahstedt-Gadenstedt, Germany

Owner:
Municipality Lahstedt
Am Breiten Tor 1
D-31246 Lahstedt, Germany

Optimization of a trickling filter for domestic sewage treatment with planted artificial wetlands

Population equivalent:
3000 PE in Gadenstedt

Planning: 1995-1996
Construction: 1997-1998

Presented as registered project of world exhibition
Expo 2000 Hannover

Wastewater treatment plant from 1959:
- trickling filter

Structural alteration measure:
- new grit chamber and screen
Enhancement of the old trickling filter:
- 4 reed planted artificial wetlands
- 3 reed planted sludge drying beds
- stormwater treatment system

Space requirement for artificial wetlands:
10,000 m²
Design parameters:
500 m³/d (dry weather) – 2000 m³/d (stormwater)

Space requirement for storm water treatment:
- 17,000 m² with green areas around
Design parameters:
123,000 m³/a and 19.250 kg COD/a from 38.5 hectare paved area

Special features:
- successful operation of the artificial wetland as secondary treatment step (shutdown of trickling filter, see results on the next page)
Performance of the reed bed treatment system in Lahstedt-Gadenstedt

Tertiary treatment of trickling filter effluent
July 1998 - November 2001
Primary/secondary treatment: fine screen, aerated grit chamber, primary sedimentation, trickling filter

<table>
<thead>
<tr>
<th>Mean values</th>
<th>COD [mg/l O2]</th>
<th>BOD5 [mg/l O2]</th>
<th>NO2-N [mg/l]</th>
<th>NO3-N [mg/l]</th>
<th>NH4-N [mg/l]</th>
<th>TN [mg/l]</th>
<th>TP [mg/l]</th>
<th>pH</th>
<th>n *</th>
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</thead>
<tbody>
<tr>
<td>Influent</td>
<td>46</td>
<td>11</td>
<td>0,6</td>
<td>13,4</td>
<td>3,7</td>
<td>17,8</td>
<td>3,9</td>
<td>7,3</td>
<td>159</td>
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<tr>
<td>Effluent</td>
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<td>3</td>
<td>0,1</td>
<td>8,0</td>
<td>1,7</td>
<td>9,6</td>
<td>2,1</td>
<td>7,5</td>
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</tbody>
</table>

Average hydraulic loading rate: 142 l/m²xd  
Table 1

Secondary treatment of municipal wastewater
December 2001 - April 2002
Primary treatment: fine screen, aerated grit chamber, primary sedimentation

<table>
<thead>
<tr>
<th>Mean values</th>
<th>COD [mg/l O2]</th>
<th>BOD5 [mg/l O2]</th>
<th>NO2-N [mg/l]</th>
<th>NO3-N [mg/l]</th>
<th>NH4-N [mg/l]</th>
<th>TN [mg/l]</th>
<th>TP [mg/l]</th>
<th>pH</th>
<th>n *</th>
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</thead>
<tbody>
<tr>
<td>Influent</td>
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<td>19</td>
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<tr>
<td>Effluent</td>
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<td>4</td>
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<td>3,1</td>
<td>7,5</td>
<td>10,7</td>
<td>2,9</td>
<td>7,3</td>
<td>19</td>
</tr>
</tbody>
</table>

Average hydraulic loading rate: 137 l/m²xd  
Table 2

n * = number of samples