Buena Borough, NJ 5 - Stage Bardenpho Carrousel®

- 1992 WWTP process prior to 2013 upgrade to add membrane biological reactor

**Process Flow**

1. Equalization
2. Screening
3. Anaerobic Zone
4. 1st Anoxic Zone
5. Aerobic Zone with Recycle to 1st Anoxic
6. 2nd Anoxic Zone
7. Alum addition in Reaeration Zone
8. Clarification
9. Sand Filtration
10. UV Disinfection
11. Effluent Discharge to Deep Run
Aerial Drone Photos of the Plant
Aerial Drone Photos of the Plant
Aerial Drone Photos of the Plant

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### Design Criteria

<table>
<thead>
<tr>
<th>Param</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0.6 MGD</td>
</tr>
<tr>
<td>BOD_i</td>
<td>250 mg/L</td>
</tr>
<tr>
<td>TSS_i</td>
<td>250 mg/L</td>
</tr>
<tr>
<td>TKNi</td>
<td>40 mg/L</td>
</tr>
<tr>
<td>TP_i</td>
<td>6.0 mg/L</td>
</tr>
<tr>
<td>BOD_e</td>
<td>5 mg/L</td>
</tr>
<tr>
<td>TN_e</td>
<td>2 mg/L</td>
</tr>
<tr>
<td>TP_e</td>
<td>0.5 mg/L</td>
</tr>
<tr>
<td>aSRT</td>
<td>17.5 days</td>
</tr>
<tr>
<td>MLSS</td>
<td>8,000 mg/L</td>
</tr>
<tr>
<td>BOD Ldg</td>
<td>33#/kft3/d (aer)</td>
</tr>
</tbody>
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**Diagram:**

- **1st Anoxic Basin**
- **2nd Anoxic Basin**
- **Aerobic Basin**
- **Pumped IR**
- **Pumped MBR Feed Line**
- **To EQ Tank**

**Process:**

- BOD + NO$_3$N $\rightarrow$ N$_2$
- NH$_3$N + O$_2$ $\rightarrow$ NO$_3$N

**Note:** No NO$_3$N or P Release Will Not Occur!!
2013 MBR Upgrade

- Added fine screen at headworks.
- Modified recycle pumping.
- Installed improved aerators for better mixing & energy efficiencies.
- Replaced clarifier, filters and undisinfection with MBR process.
- Added carbon feed source.
Typical MBR Configuration
Total Suspended Solids Monthly Average Concentration

Buena Borough Municipal Utilities Authority - Wastewater Treatment Plant
Total Suspended Solids Monthly Average Concentration (2013 to 2018)

Discharge Concentration (mg/l)

Month

TSS MOAV (mg/l)  Discharge Limit = 29.72 mg/l
BOD Monthly Average Concentration

Buena Borough Municipal Utilities Authority - Wastewater Treatment Plant
BOD Monthly Average Concentration (2013 to 2018)

- Discharge Concentration (mg/l)
- Month

- Blue line: BOD MOAV (mg/l)
- Red line: Discharge Limit = 14.86 mg/L

Graph shows the BOD concentration for each month from August 2013 to June 2018.
Phosphorous Monthly Average Concentration

Buena Borough Municipal Utilities Authority - Wastewater Treatment Plant
Phosphorous Monthly Average Concentration (2013 to 2018)

Discharge Concentration (mg/l)

Month

Phosphorous MOAV (mg/l)  Discharge Limit = 0.15 mg/l
Nitrate Monthly Average Concentration
Ammonia Monthly Average Concentration
Total Nitrogen Monthly Average Concentration

Buena Borough Municipal Utilities Authority - Wastewater Treatment Plant
Total Nitrogen Monthly Average Concentration (2013 to 2018)

Discharge Concentration (mg/l)

Month

- Total Nitrogen MOAV (mg/l)
- Discharge Limit = 3 mg/l
Bio-Solids Process-Composting
Bio-Solids Process-Composting