The Back River Wastewater Treatment Plant (WWTP) Progress Report
June 10, 2022

**Treatment Plant Overview**

One of the primary concerns is the processing and management of biosolids and the removal of solids from process equipment. Sludge is now being sent to the Quarantine Road Landfill, which has opened up a new source of disposal, and the Maryland Environmental Service (MES) has helped accelerate the timeline of certain projects to clean Primary Settling Tanks (PSTs).

**Primary Treatment**

**PSTs**

- The PSTs allow the solid material within the wastewater to be easily separated by settling to the bottom or floating to the surface for removal.
- **Currently, only two of the 11 PSTs are functioning.** MES has cleaned PST #7, and Baltimore City has issued contracts to clean five others. After cleaning, four of the PSTs will require various repairs.

**Secondary Treatment**

**Biological Treatment Activated Sludge**

- **Newly constructed Activated Sludge Plant #4 is now online.** This will allow Baltimore City Department of Public Works (DPW) to take Activated Sludge Plant #3 offline in order to remove sludge and make repairs to non-functioning blowers and mixers. Once completed, this project will improve nitrogen removal and lower solids concentrations in the biological reactors.
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

Secondary Clarifiers

- There are 36 secondary clarifiers. Twelve (12) are associated with Activated Sludge Plant #4, which was just put into service. A third-party engineering assessment determined that the Return Activated Sludge (RAS) pumps and wasting pumps require replacement. RAS pump failure would cause poor performance of the biological reactors and wasting pump failure would prevent the wasting of sludge, which would cause a buildup of solids in the treatment system.
- The May 19, 2022 daily report from MES stated that some of the RAS and sludge pumps were evaluated and repaired in the Activated Sludge Plant #3, and two other pumps are on order.

Tertiary Treatment

Denitrification Filters

- The facility has 52 Denitrification filters (DNFs) designed to achieve effluent nitrogen concentrations at or below 3 milligrams per liter (mg/l) total nitrogen.
- The Back River WWTP is experiencing problems with the DNFs because of the problems with solids. The solids are clogging the filter media causing many of the filters to either not function properly or not function at all. In addition, there are mechanical and control system problems that have to be repaired.
- DPW has engaged ProStart Inc. to manage and operate the DNF system. MES has performed an evaluation of malfunctioning level transducers and control units and there are plans for more comprehensive evaluations of the DNF system once equipment needs are confirmed. Once completed, the filters can be backwashed frequently to remove the solids.
Sand Filters

- The treatment system has 26 functioning sand filters; 22 are not functioning due to various equipment failures, insufficient sand, and mechanical issues.
- MES is in the process of evaluating the sand filters and their mechanics are replacing and repairing components. There are 10 pumps for the sand filters on order.

Final Effluent

- The analytical data has shown that there has been some progress made in getting the Back River WWTP into compliance with the discharge permit.
  - The TSS concentration has been a factor in creating high nutrient concentrations. Data from April and May show that the average TSS concentration at discharge point Outfall 001 is 9 mg/L compared to 21 mg/L for January and 17.5 mg/L for February and 14.2 mg/L for March.
  - The data indicate progress toward the goal of removing the clogging solids from the treatment system

Biosolids Management

- Gravity sludge thickener (GST) 2 B is back in service.
  - Synagro is contracted to evaluate the three centrifuges owned by Back River WWTP.
  - Synagro’s pelletizer is back online and processing 36.69 tons/day

Graphs Showing Final Effluent Concentrations and Loading Performance for 2022.
City of Baltimore, Back River W.W.T.P.
S.S. Concentration Outfall 001
Weekly Average

Permit Limit =

Week
Mar.'22 wk1  Mar.'22 wk2  Mar.'22 wk3  Mar.'22 wk4  Apr.'22 wk1  Apr.'22 wk2  Apr.'22 wk3  Apr.'22 wk4  May'22 wk1  May'22 wk2  May'22 wk3  May'22 wk4

Rain total inches
-5 0 2 4 6 8 10 12 14 16 18 20

Plant Effl. mg/l
-5 0 5 10 15 20

SS  limit  Weekly total BWI precipitation (rain, melted snow) inches
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
B.O.D. Concentration Outfall 001
Weekly Average

Permit Limit = 15 mg/l
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
S.S. Loading Outfall 001
Weekly Average

Permit Limit = 16,000

Week

Mar.'22 wk1  Mar.'22 wk2  Mar.'22 wk3  Mar.'22 wk4  Apr.'22 wk1  Apr.'22 wk2  Apr.'22 wk3  Apr.'22 wk4  May'22 wk1  May'22 wk2  May'22 wk3  May'22 wk4

Weekly total BWI precipitation (rain, melted snow) inches

Plant Effl. lbs./day
City of Baltimore, Back River W.W.T.P.
B.O.D. Loading Outfall 001
Weekly Average

Permit Limit = 16,000
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
T.P. Concentration Outfall 001
Weekly Average

Plant Effl. mg/l

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<thead>
<tr>
<th>Week</th>
<th>TP</th>
<th>Permit limit</th>
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June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
T.P. Loading Outfall 001
Weekly Average

Permit Limit = 330 lbs./day

Week

Mar.'22 wk1 Mar.'22 wk2 Mar.'22 wk3 Mar.'22 wk4 Apr.'22 wk1 Apr.'22 wk2 Apr.'22 wk3 Apr.'22 wk4 May'22 wk1 May'22 wk2 May'22 wk3 May'22 wk4

Plant Effl. lbs./day Rain total inches

TP limit Weekly total BWI precipitation (rain, melted snow) inches
City of Baltimore, Back River W.W.T.P.
TKN Concentration Outfall 001
Weekly Average

Week

Mar.'22 wk1   Mar.'22 wk2   Mar.'22 wk3   Mar.'22 wk4   Apr.'22 wk1   Apr.'22 wk2   Apr.'22 wk3   Apr.'22 wk4   May'22 wk1   May'22 wk2   May'22 wk3   May'22 wk4

Plant Effl. mg/l

0.0  2.0  4.0  6.0  8.0  10.0  12.0  14.0

Rain total inches

0.0  2.0  4.0  6.0  8.0  10.0  12.0  14.0  16.0  18.0  20.0  22.0  24.0  26.0

TKN
Weekly total BWI precipitation (rain, melted snow) inches

Mar.'22 wk1: 6.1
Mar.'22 wk2: 12.1
Mar.'22 wk3: 6.3
Mar.'22 wk4: 3.3
Apr.'22 wk1: 7.6
Apr.'22 wk2: 3.0
Apr.'22 wk3: 2.2
Apr.'22 wk4: 2.4
May'22 wk1: 3.6
May'22 wk2: 2.0
May'22 wk3: 1.9
May'22 wk4: 1.4
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
TKN Loading Outfall 001
Weekly Average

Week

Mar.'22 wk1
Mar.'22 wk2
Mar.'22 wk3
Mar.'22 wk4
Apr.'22 wk1
Apr.'22 wk2
Apr.'22 wk3
Apr.'22 wk4
May'22 wk1
May'22 wk2
May'22 wk3
May'22 wk4

Plant Effl. lbs./day

0
2,000
4,000
6,000
8,000
10,000
12,000

TKN
Weekly total BWI precipitation (rain, melted snow) inches
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

**City of Baltimore, Back River W.W.T.P.**
**NH3 Concentration Outfall 001**
**Weekly Average**

[Graph showing NH3 concentration over weeks with Summer and Winter permit periods marked.]
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
NH3 Loading Outfall 001
Weekly Average

Plant Effl. lbs./day

Permit Limit = 3,300 lbs./day

Winter permit period

Week
City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Weekly Average

Week

Mar. '22 wk1  Mar. '22 wk2  Mar. '22 wk3  Mar. '22 wk4  Apr. '22 wk1  Apr. '22 wk2  Apr. '22 wk3  Apr. '22 wk4  May '22 wk1  May '22 wk2  May '22 wk3  May '22 wk4

Plant Effl. mg/l

Rain total inches

0.0  1.0  2.0  3.0  4.0  5.0  6.0  7.0  8.0  9.0  10.0  11.0  12.0  13.0  14.0  15.0

0  2  4  6  8  10  12  14  16  18

-1

City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Weekly Average

Week

Mar. '22 wk1  Mar. '22 wk2  Mar. '22 wk3  Mar. '22 wk4  Apr. '22 wk1  Apr. '22 wk2  Apr. '22 wk3  Apr. '22 wk4  May '22 wk1  May '22 wk2  May '22 wk3  May '22 wk4

Plant Effl. mg/l

Rain total inches

0.0  1.0  2.0  3.0  4.0  5.0  6.0  7.0  8.0  9.0  10.0  11.0  12.0  13.0  14.0  15.0

0  2  4  6  8  10  12  14  16  18

-1

City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Weekly Average

Week

Mar. '22 wk1  Mar. '22 wk2  Mar. '22 wk3  Mar. '22 wk4  Apr. '22 wk1  Apr. '22 wk2  Apr. '22 wk3  Apr. '22 wk4  May '22 wk1  May '22 wk2  May '22 wk3  May '22 wk4

Plant Effl. mg/l

Rain total inches

0.0  1.0  2.0  3.0  4.0  5.0  6.0  7.0  8.0  9.0  10.0  11.0  12.0  13.0  14.0  15.0

0  2  4  6  8  10  12  14  16  18

-1
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
T.N. Loading Outfall 001
Weekly Average

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<th>Week</th>
<th>Rain total inches</th>
<th>Plant Effl. lbs./day</th>
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Weekly total BWI precipitation (rain, melted snow) inches
What You Need to Know

City of Baltimore, Back River W.W.T.P.
E-coli Concentration Outfall 001
Weekly Average

 Permit Limit = 126 mg/l

Week

Mar.'22 wk1 Mar.'22 wk2 Mar.'22 wk3 Mar.'22 wk4 Apr.'22 wk1 Apr.'22 wk2 Apr.'22 wk3 Apr.'22 wk4 Apr.'22 wk5 May'22 wk1 May'22 wk2 May'22 wk3 May'22 wk4 May'22 wk5

Plant Effl. MPN/100ml

Weekly total BWI precipitation (rain, melted snow) inches

Week

Mar.'22 wk1 Mar.'22 wk2 Mar.'22 wk3 Mar.'22 wk4 Apr.'22 wk1 Apr.'22 wk2 Apr.'22 wk3 Apr.'22 wk4 Apr.'22 wk5 May'22 wk1 May'22 wk2 May'22 wk3 May'22 wk4 May'22 wk5

Rain total inches

-100 0 50 100 150 200 250 300 350

-50 0 5 10 15 20 25
City of Baltimore, Back River W.W.T.P.
S.S. Concentration Outfall 001
Monthly Average

<table>
<thead>
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<th>Month</th>
<th>Plant Effl. mg/l</th>
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<td>Sep-21</td>
<td>9</td>
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<td>Oct-21</td>
<td>5</td>
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<td>Nov-21</td>
<td>0</td>
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<td>Dec-21</td>
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<td>Jan-22</td>
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<td>Mar-22</td>
<td>14</td>
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<tr>
<td>Apr-22</td>
<td>8</td>
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<tr>
<td>May-22</td>
<td>8</td>
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Permit Limit = 10

29 days of
City of Baltimore, Back River W.W.T.P.
S.S. Loading Outfall 001
Monthly Average

Perm Limit = 11,000

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<th>Month</th>
<th>Plant Eff. lbs./day</th>
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<td>Oct-21</td>
<td>5,102</td>
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<tr>
<td>Nov-21</td>
<td>3,348</td>
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<td>Jan-22</td>
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<td>Feb-22</td>
<td>19,165</td>
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<tr>
<td>Mar-22</td>
<td>12,122</td>
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<td>Apr-22</td>
<td>7,277</td>
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<tr>
<td>May-22</td>
<td>7,955</td>
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29 days of finalized data
City of Baltimore, Back River W.W.T.P.
B.O.D. Concentration Outfall 001
Monthly Average

Permit Limit = 10

Month


Plant Effl. mg/l

0 2 4 6 8 10 12 14 16

Month

BOD
limit
Monthly total BWI precipitation (rain, melted snow) inches

26 days of finalized data
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
B.O.D. Loading Outfall 001
Monthly Average

- Permit Limit = 11,000
- Monthly total BWI precipitation (rain, melted snow) inches

- Sep-21: 3,206
- Oct-21: 3,701
- Nov-21: 2,848
- Dec-21: 5,587
- Jan-22: 8,418
- Feb-22: 10,600
- Mar-22: 12,621
- Apr-22: 8,851
- May-22: 4,668

- 26 days of finalized data

- Blue line: BOD
- Green line: Monthly total BWI precipitation (rain, melted snow) inches
- Red line: Permit Limit = 11,000
City of Baltimore, Back River W.W.T.P.
T.P. Concentration Outfall 001
Monthly Average

Month
Plant Effl. mg/L
0.00 0.20 0.14 0.37 0.64 1.07 1.45 0.65 0.27

Permit Limit = 0.20

TP limit
Monthly total BWI precipitation (rain, melted snow) inches
0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

23 days of finalized data
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
T.P. Loading Outfall 001
Monthly Average

<table>
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<th>Month</th>
<th>Plant Effl. lbs./day</th>
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<td>May-22</td>
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Permit Limit = 220

23 days of finalized data
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
TKN Concentration Outfall 001
Monthly Average

<table>
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<tr>
<th>Month</th>
<th>Rain total inches</th>
<th>Plant Effl. mg/l</th>
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<td>Sep-21</td>
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23 days of finalized data

TKN
Monthly total BWI precipitation (rain, melted snow) inches
June 10, 2022 Back River Wastewater Treatment Plant Update
What You Need to Know

City of Baltimore, Back River W.W.T.P.
TKN Loading Outfall 001
Monthly Average

<table>
<thead>
<tr>
<th>Month</th>
<th>Plant Effl. lbs/day</th>
<th>Monthly total BWI precipitation (rain, melted snow) inches</th>
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<tr>
<td>Mar-22</td>
<td>6,240</td>
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<td>May-22</td>
<td>2,126</td>
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TKN
Monthly total BWI precipitation (rain, melted snow) inches
City of Baltimore, Back River W.W.T.P.
NH3 Concentration Outfall 001
Monthly Average

Winter Permit Limit = 2.0 mg/l
Summer Permit Limit = 2.0 mg/l

Month

March 2022 - May 2022

- NH3
- Winter limit
- Summer limit
- Monthly total BWI precipitation (rain, melted snow) inches

Days of final data
City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Monthly Average

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<th>Month</th>
<th>Plant Effl. mg/l</th>
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City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Monthly Average

- TN
- Floating cap
- Monthly total BWI precipitation (rain, melted snow) inches
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
T.N. Loading Outfall 001
Monthly Average

[Graph showing monthly average of TN (Total Nitrogen) loading outfall 001 from September 2021 to May 2022.]

- Sep-21: 4,915 lbs./day
- Oct-21: 4,646 lbs./day
- Nov-21: 4,528 lbs./day
- Dec-21: 2,774 lbs./day
- Jan-22: 5,762 lbs./day
- Feb-22: 8,415 lbs./day
- Mar-22: 9,337 lbs./day
- Apr-22: 6,560 lbs./day
- May-22: 5,037 lbs./day

Rain total inches:
- Sep-21: 23 inches
- Oct-21: 21 inches
- Nov-21: 12 inches
- Dec-21: 5 inches
- Jan-22: 10 inches
- Feb-22: 23 inches
- Mar-22: 20 inches
- Apr-22: 15 inches
- May-22: 20 inches

23 days of finalized data.

City of Baltimore, Back River W.W.T.P.
T.N. Loading Outfall 001
Monthly Average

- TN
- Monthly total BWI precipitation (rain, melted snow) inches

Month

- Sep-21
- Oct-21
- Nov-21
- Dec-21
- Jan-22
- Feb-22
- Mar-22
- Apr-22
- May-22

Plant Effl. lbs./day

Rain total inches

1800 Washington Boulevard | Baltimore, MD 21230 | 1-800-633-6101 | 410-537-3000 | TTY Users 1-800-735-2258

www.mde.maryland.gov

apperson/oc/june/2022
June 10, 2022 Back River Wastewater Treatment Plant Update

What You Need to Know

City of Baltimore, Back River W.W.T.P.
E-coli Outfall 001
Monthly Average

<table>
<thead>
<tr>
<th>Month</th>
<th>Plant Effl. MPN/100ml</th>
<th>Rain total inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep-21</td>
<td>42</td>
<td>-20</td>
</tr>
<tr>
<td>Oct-21</td>
<td>59</td>
<td>0</td>
</tr>
<tr>
<td>Nov-21</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Dec-21</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>Jan-22</td>
<td>41</td>
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<tr>
<td>Feb-22</td>
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<td>43</td>
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<tr>
<td>Mar-22</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Apr-22</td>
<td>53</td>
<td>7</td>
</tr>
<tr>
<td>May-22</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Permit Limit = 126 MPN/100ml

31 days of finalized data