

JBT01 tile drain monitoring station

Assessment of Tile Drainage Systems in the Jewett Brook Watershed:

November 2017 Monitoring Summary

PROJECT NO.

15-309

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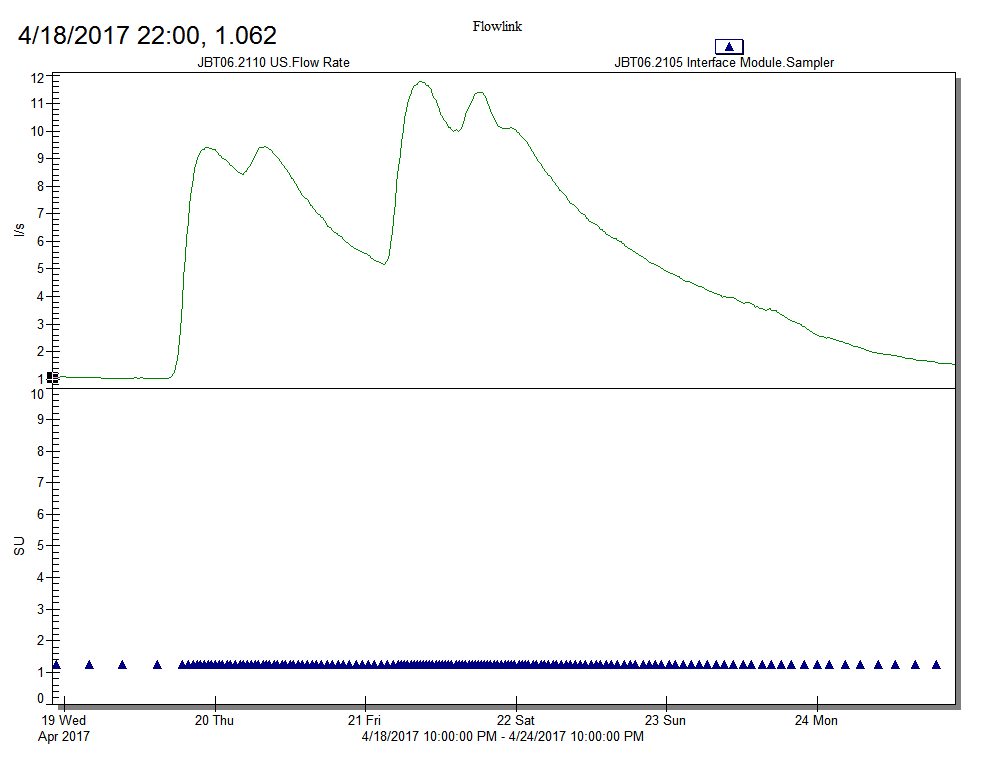
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November 2017 Monitoring Summary

The purpose of this report is to document monitoring activities performed last month, in November 2017, at 12 selected tile drain outlets in the Jewett Brook watershed in St. Albans, Vermont.

All 12 stations are operational. Table 1 identifies the start dates for monitoring activities at each station. The first set of weekly composite samples was collected and processed on April 11, in accordance with the project Quality Assurance Project Plan, Version 1.0, Amendment 1.

Figure . Example flow rate and sampling marks from Station JBT06



Every 30 minutes, flow and sampling data are transmitted to Stone’s server. These data are checked periodically to assess whether the sampling program is working as intended. Figure 1 displays an example of flow data (top panel) at station JBT06, along with the time each sample aliquot was dispensed to the sample carboys (bottom panel). Figure 2 displays flow data from the start of the monitoring period at JBT01. These data are considered representative of the pattern of flow observed across all the stations.

Flow monitoring and sample collection continues at all 12 stations. Flow-paced, composite samples are collected approximately weekly. Through November, 34 sampling rounds have been performed at the tile drain monitoring sites. Flow-pacing settings are adjusted at the start of each sampling round, based on recently measured flow rates and the weather forecast. The goal is to produce a composite sample that is representative of that week’s flow conditions at each site and is of appropriate volume. Stone’s subcontractor, the Friends of Northern Lake Champlain, is performing the majority of the sample processing. Regular maintenance activities include checking/changing instrument desiccant and removing vegetation shading solar panels.

Sampling activities remained generally successful through November. On October 11th, the autosamplers were reprogrammed with two-part programs, each program part having a unique flow pacing setting. This change was made to increase the likelihood of collecting representative, composite samples of sufficient volume, while reducing the potential of oversampling and premature filling of the full set of carboys. Cold temperatures the week of November 14th froze all the composite samples. As of November 14th, automated composite sampling was suspended due to below freezing conditions. We are currently collecting grab samples at all stations once per week. Additionally, the monitoring manholes are being insulated to protect the flowmeters against damage.

Providing sufficient power to all stations has been challenging under late fall conditions. The orientation of solar panels has been adjusted and additional solar panels have been added at the three stations with poor solar exposure, JBT01, JBT02, and JBT04. At JBT02 and JBT04, the deep cycle batteries have needed to be replaced with fresh batteries. Additionally, solar panels at JBT02 were vandalized and need to be replaced.

Manure applications were observed on October 27th at JBT05 and JBT06 and on November 15th at JBT01 and JBT02.

Composite samples collected at the tile drain monitoring stations are analyzed by the Vermont Agriculture and Environmental Laboratory for concentrations of total phosphorus (TP), total dissolved phosphorus (TDP), and total nitrogen (TN). Beginning in August and continuing through October, sample splits were collected for TN analysis on alternate weeks rather than weekly. Table 2 presents these data for all analyses classified as Approved. Results are not yet available for samples collected since October 17th, 2017.

We are currently computing flow totals corresponding with each composite sampling period, and will use the interval flow and constituent concentration data to calculate nutrient loads.

Table : Start dates for monitoring activities at each station

| Station | Start flow monitoring | Start autosampling |
| --- | --- | --- |
| JBT01 | 3/23/17 | 4/5/17 |
| JBT02 | 3/23/17 | 4/5/17 |
| JBT04 | 4/3/17 | 4/5/17 |
| JBT05 | 4/20/17 | 4/20/17 |
| JBT06 | 4/5/17 | 4/5/17 |
| JBT07 | 3/30/17 | 4/5/17 |
| JBT11 | 4/5/17 | 4/5/17 |
| JBT13 | 4/3/17 | 4/11/17 |
| JBT14 | 4/5/17 | 4/5/17 |
| JBT16 | 3/30/17 | 4/5/17 |
| JBT18 | 4/22/17 | 4/22/17 |
| JBT19 | 4/22/17 | 4/22/17 |

Table 2: TP, TDP, and TN concentrations in composite samples collected through Oct. 17, 2017

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT01 | 4/11/2017 | 1 | 491 | 258 | 4.81 |
| JBT01 | 4/18/2017 | 1 | 55.1 | 21.1 | 4.77 |
| JBT01 | 4/25/2017 | 1 | 77.3 | 17.6 | 5.24 |
| JBT01 | 5/2/2017 | 1 | 333 | 81.2 | 5.63 |
| JBT01 | 5/9/2017 | 1 | 208 | 44.5 | 5.29 |
| JBT01 | 5/9/2017 | 2+3 | 236 | 40.8 | 5.17 |
| JBT01 | 5/16/2017 | 1 | 26.7 | 15.4 | 4.96 |
| JBT01 | 5/23/2017 | 1 | 127 | 26.7 | 5.27 |
| JBT01 | 5/30/2017 | 1 | 19.3 | 13 | 5.13 |
| JBT01 | 6/7/2017 | 1 | 23.5 | 7.6 | 5.32 |
| JBT01 | 6/13/2017 | 1 | 23.9 | 13.9 | 5.29 |
| JBT01 | 6/22/2017 | 1 | 28.6 | 16.1 | 6.48 |
| JBT01 | 6/27/2017 | 1 | 108 | 64.4 | 22.19 |
| JBT01 | 6/27/2017 | 2 | 111 | 72.2 | 15.57 |
| JBT01 | 6/27/2017 | 3 | 63.8 | 44.1 | 8.47 |
| JBT01 | 7/5/2017 | 1 | 256 | 77.9 | 8.05 |
| JBT01 | 7/5/2017 | 2+3 | 94.6 | 46.7 | 6.27 |
| JBT01 | 7/11/2017 | 1+2 | 223 | 106 | 6.63 |
| JBT01 | 7/18/2017 | 1 | 98 | 47.5 | 5.31 |
| JBT01 | 7/26/2017 | 1 | 21.7 | 31.6 | 4.4 |
| JBT01 | 8/1/2017 | 1 | 23.8 | 20.9 | 3.69 |
| JBT01 | 8/8/2017 | 1 | 33.3 | 20.1 | N.S.B |
| JBT01 | 8/22/2017 | 1 | 55.5 | 26.6 | 3.1 |
| JBT01 | 9/5/2017 | 1 | 37 | 13.6 | 3.81 |
| JBT01 | 9/12/2017 | 1 | 114.4 | 34 | N.S.B |
| JBT01 | 9/19/2017 | 1 | 116.1 | 73 | 2.4 |
| JBT01 | 9/26/2017 | 1 | 119 | 18.3 | N.S.B |
| JBT01 | 10/3/2017 | 1 | 49.3 | 14.8 | 3.53 |
| JBT01 | 10/10/2017 | 1 | 1250 | 45.3C | N.S.B |
| JBT01 | 10/10/2017 | 2 | 1204 | 35C | N.S.B |
| JBT01 | 10/10/2017 | 3+4 | 914 | 37.9C | N.S.B |
| B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT02 | 4/11/2017 | 1 | 976 | 678 | 7.19 |
| JBT02 | 4/18/2017 | 1 | 242 | 93.6 | 8.52 |
| JBT02 | 4/25/2017 | 1 | 491 | 142 | 8.68 |
| JBT02 | 5/2/2017 | 1 | 805 | 492 | 8.58 |
| JBT02 | 5/9/2017 | 1 | 585 | 120 | 8.52 |
| JBT02 | 5/9/2017 | 2 | 868 | 122 | 7.88 |
| JBT02 | 5/9/2017 | 3 | 868 | 156 | 8 |
| JBT02 | 5/16/2017 | 1 | 109 | 37.6 | 8.26 |
| JBT02 | 5/30/2017 | 1 | 78.5 | 30.3 | 8.83 |
| JBT02 | 6/7/2017 | 1 | 67.3 | 28.2 | 11.78 |
| JBT02 | 6/13/2017 | 1 | 48 | 28.5 | 11.69 |
| JBT02 | 6/22/2017 | 1 | 90.9 | 42.3 | 12.86 |
| JBT02 | 6/26/2017 | 1 | 137 | 61.9 | 25.34 |
| JBT02 | 6/26/2017 | 2 | 189 | 82.2 | 29.34 |
| JBT02 | 6/26/2017 | 3 | 160 | 94 | 27.34 |
| JBT02 | 6/26/2017 | 4 | 315 | 106 | 22.93 |
| JBT02 | 7/5/2017 | 1+2 | 102 | 60.5 | 9.85 |
| JBT02 | 7/11/2017 | 1 | 303 | 118 | 8.68 |
| JBT02 | 7/11/2017 | 2 | 433.5 | 196 | 7.19 |
| JBT02 | 7/18/2017 | 1 | 186.5 | 118 | 7.27 |
| JBT02 | 7/26/2017 | 1 | 73.1 | 70.4 | 8.03 |
| JBT02 | 8/1/2017 | 1 | 63.9 | 40 | 8.41 |
| JBT02 | 8/8/2017 | 1 | 50.5 | 37 | N.S.B |
| JBT02 | 8/15/2017 | 1 | 52 | 41.3 | 7.29 |
| JBT02 | 8/22/2017 | 1 | 307.5 | 141 | 5.81 |
| JBT02 | 8/30/2017 | 1 | 142.2 | 63.2 | N.S.B |
| JBT02 | 9/5/2017 | 1 | 137 | 53.4 | 5.09 |
| JBT02 | 9/12/2017 | 1 | 674 | 106 | N.S.B |
| JBT02 | 9/19/2017 | 1 | 138.5 | 85.6 | 6.36 |
| JBT02 | 9/26/2017 | 1 | 102.4 | 65.2 | N.S.B |
| JBT02 | 10/3/2017 | 1 | 81.3 | 43.3 | 4.93 |
| JBT02 | 10/10/2017 | 1 | 1464 | 69.7C | N.S.B |
| JBT02 | 10/10/2017 | 2 | 1322 | 77.5C | N.S.B |
| JBT02 | 10/10/2017 | 3+4 | 1202 | 91.7C | N.S.B |
| JBT02 | 10/17/2017 | 1 | 252 | 86.7 | 9.22 |
| B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT04 | 4/11/2017 | 1 | 798 | 120 | 4.89 |
| JBT04 | 4/18/2017 | 1 | 115 | 38.6 | 4.33 |
| JBT04 | 4/25/2017 | 1 | 133 | 45.4 | 4.86 |
| JBT04 | 5/2/2017 | 1 | 500 | 79.2 | 5.43 |
| JBT04 | 5/9/2017 | 1 | 303 | 52.9 | 4.19 |
| JBT04 | 5/9/2017 | 2+3 | 404 | 58.8 | 4.23 |
| JBT04 | 5/16/2017 | 1 | 68.8 | 22.2 | 3.8 |
| JBT04 | 5/23/2017 | 1 | 109 | 23.6 | 4.35 |
| JBT04 | 5/30/2017 | 1 | 90.2 | 18.1 | 4.37 |
| JBT04 | 6/7/2017 | 1 | 114 | 10.7 | 5.65 |
| JBT04 | 6/13/2017 | 1 | 42.9 | 19.6 | 5.19 |
| JBT04 | 6/22/2017 | 1 | 108 | 49.5 | 5.39 |
| JBT04 | 6/27/2017 | 1 | 184 | 52.4 | 29.19 |
| JBT04 | 6/27/2017 | 2 | 135 | 49.6 | 27.59 |
| JBT04 | 6/27/2017 | 3 | 115 | 65.3 | 16.71 |
| JBT04 | 6/27/2017 | 4 | 73.6 | 50.1 | 11.85 |
| JBT04 | 7/5/2017 | 1 | 270.5 | 53 | 13.07 |
| JBT04 | 7/5/2017 | 2+3 | 132 | 52.6 | 7.29 |
| JBT04 | 7/11/2017 | 1+2 | 261.5 | 51.5 | 8.25 |
| JBT04 | 7/18/2017 | 1 | 125.5 | 38.4 | 5.79 |
| JBT04 | 7/26/2017 | 1 | 39.5 | 50.4 | 4.36 |
| JBT04 | 8/1/2017 | 1 | 30.5 | 24.1 | 3.81 |
| JBT04 | 8/8/2017 | 1 | 35.2 | 20.6 | N.S.B |
| JBT04 | 8/15/2017 | 1 | 29.8 | 22.6 | 2.92 |
| JBT04 | 8/22/2017 | 1 | 465 | 228 | 5.89 |
| JBT04 | 8/30/2017 | 1 | 71 | 23.5 | N.S.B |
| JBT04 | 9/5/2017 | 1 | 152 | 21.5 | 3.19 |
| JBT04 | 9/12/2017 | 1+2 | 698 | 32.4 | N.S.B |
| JBT04 | 9/19/2017 | 1 | 64.8 | 22.5 | 1.29 |
| JBT04 | 9/26/2017 | 1 | 67.6 | 32 | N.S.B |
| JBT04 | 10/3/2017 | 1 | 78.3 | 31 | 1.05 |
| JBT04 | 10/10/2017 | 1 | 500 | 33.5C | N.S.B |
| JBT04 | 10/10/2017 | 2 | 256 | 34.7C | N.S.B |
| JBT04 | 10/10/2017 | 3+4 | 244 | 39.3C | N.S.B |
| JBT04 | 10/17/2017 | 1 | 102 | 23.9 | 1.38 |
| B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT05 | 4/25/2017 | 1 | 68.7 | 53.7 | 24.78 |
| JBT05 | 5/2/2017 | 1 | 226 | 108 | 20.6 |
| JBT05 | 5/9/2017 | 1 | 132 | 82.9 | 23.56 |
| JBT05 | 5/16/2017 | 1 | 33.6 | 26.6 | 21.68 |
| JBT05 | 5/23/2017 | 1 | 60 | 38.4 | 14.84 |
| JBT05 | 5/30/2017 | 1 | 38.4 | 37 | 10.52 |
| JBT05 | 6/6/2017 | 1+2 | 34.1 | 21.4 | 8.1 |
| JBT05 | 6/13/2017 | 1+2+3 | 67.6 | 49.6 | 12.68 |
| JBT05 | 6/22/2017 | 1 | 61.2 | 40.6 | 14.48 |
| JBT05 | 6/27/2017 | 1+2 | 345 | 285.3 | 34.73 |
| JBT05 | 6/27/2017 | 3+4 | 408 | 357 | 27.73 |
| JBT05 | 6/30/2017 | 1 | 79.7 | 57.2 | 24.83 |
| JBT05 | 6/30/2017 | 2 | 595 | 452 | 21.23 |
| JBT05 | 6/30/2017 | 3 | 210 | 181 | 23.63 |
| JBT05 | 7/5/2017 | 1 | 134 | 100 | 24.58 |
| JBT05 | 7/11/2017 | 1+2 | 565 | 493 | 23.7 |
| JBT05 | 7/18/2017 | 1 | 138 | 104 | 29.55 |
| JBT05 | 7/26/2017 | 1 | 51.5 | 85.8 | 23.8 |
| JBT05 | 8/1/2017 | 1 | 42.8 | 37.6 | 21.61 |
| JBT05 | 8/8/2017 | 1+2 | 46.6 | 51.1 | N.S.B |
| JBT05 | 8/15/2017 | 1 | 32.2 | 26.1 | 10.63 |
| JBT05 | 8/22/2017 | 1 | 124.8 | 44.4 | 15.31 |
| JBT05 | 8/30/2017 | 1 | 91.1 | 28.6 | N.S.B |
| JBT05 | 9/5/2017 | 1 | 204 | 51.3 | 10.41 |
| JBT05 | 9/12/2017 | 1 | 133 | 67.6 | N.S.B |
| JBT05 | 9/19/2017 | 1 | 65.2 | 30.6 | 11.76 |
| JBT05 | 9/26/2017 | 1 | 39 | 22.3 | N.S.B |
| JBT05 | 10/3/2017 | 1 | 43.7 | 22.4 | 7.82 |
| JBT05 | 10/10/2017 | 1 | 966 | 383.2 | 18.54 |
| JBT05 | 10/17/2017 | 1 | 167.0 | 122 | 12.63 |
| B: TN analyzed on alternate weeks | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT06 | 4/11/2017 | 1 | 195 | 131 | 33.47 |
| JBT06 | 4/18/2017 | 1 | 192 | 76.3 | 20.71 |
| JBT06 | 4/25/2017 | 1 | 117 | 70.1 | 24.03 |
| JBT06 | 5/2/2017 | 1 | 321 | 164 | 25.2 |
| JBT06 | 5/9/2017 | 1 | 150 | 100 | 28.2 |
| JBT06 | 5/9/2017 | 2 | 135 | 98.1 | 13.54 |
| JBT06 | 5/16/2017 | 1 | 180 | 96.2 | 26.04 |
| JBT06 | 5/23/2017 | 1 | 327 | 65.2 | 21.04 |
| JBT06 | 5/30/2017 | 1 | 67.7 | 37.8 | 22.52 |
| JBT06 | 6/7/2017 | 1 | 138 | 88.9 | 25.87 |
| JBT06 | 6/13/2017 | 1 | 47.4 | 36.4 | 25.95 |
| JBT06 | 6/22/2017 | 1 | 45.9 | 27.3 | 23.12 |
| JBT06 | 6/27/2017 | 1 | 412 | 192 | 42.67 |
| JBT06 | 6/27/2017 | 2 | 210 | 157 | 48.27 |
| JBT06 | 6/27/2017 | 3 | 416 | 222 | 46.63 |
| JBT06 | 6/27/2017 | 4 | 234 | 183 | 49.83 |
| JBT06 | 6/30/2017 | All4 | 266.4 | 174 | 33.83 |
| JBT06 | 7/5/2017 | 1 | 134 | 109 | 34.82 |
| JBT06 | 7/11/2017 | 1+2 | 228 | 137 | 26.5 |
| JBT06 | 7/18/2017 | 1 | 128.4 | 106 | 32.55 |
| JBT06 | 7/26/2017 | 1 | 39.1 | 90.2 | 27.4 |
| JBT06 | 10/10/2017 | 1 | 393 | 171 | N.S.B |
| B: TN analyzed on alternate weeks | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT07 | 4/11/2017 | 1 | 708 | 159 | 7.52 |
| JBT07 | 4/18/2017 | 1 | 45 | 14.1 | 4.81 |
| JBT07 | 4/25/2017 | 1 | 103 | 27.4 | 5.79 |
| JBT07 | 5/2/2017 | 1 | 279.6 | 58 | 6.72 |
| JBT07 | 5/9/2017 | 1 | 126 | 41.4 | 6.17 |
| JBT07 | 5/9/2017 | 2+3 | 230 | 54.2 | 6.59 |
| JBT07 | 5/16/2017 | 1 | 19.7 | 12.9 | 5.21 |
| JBT07 | 5/23/2017 | 1 | 24.4 | 11.9 | 5.08 |
| JBT07 | 5/30/2017 | 1 | 21.1 | 14.2 | 5.29 |
| JBT07 | 6/7/2017 | 1 | 17 | 6.98 | 5.57 |
| JBT07 | 6/13/2017 | 1 | N.S.A | 13.1 | 5.35 |
| JBT07 | 6/22/2017 | 1 | 39.3 | 17.1 | 8.16 |
| JBT07 | 6/26/2017 | 1 | 242 | 177 | 45.18 |
| JBT07 | 6/26/2017 | 2 | 555 | 357 | 45.18 |
| JBT07 | 6/26/2017 | 3 | 204 | 182 | 31.59 |
| JBT07 | 6/26/2017 | 4 | 389.2 | 230 | 23.59 |
| JBT07 | 6/30/2017 | 1 | 79.7 | 60.8 | 12.67 |
| JBT07 | 6/30/2017 | 2+3 | 700 | 327 | 18.55 |
| JBT07 | 7/5/2017 | 1 | 119 | 88.6 | 11.62 |
| JBT07 | 7/11/2017 | 1 | 47.3 | 21 | 11.05 |
| JBT07 | 7/18/2017 | 1 | 69.9 | 54.9 | 15.37 |
| JBT07 | 7/26/2017 | 1 | 82.5 | 37.3 | 9.14 |
| JBT07 | 8/1/2017 | 1 | 29.4 | 25.1 | 6.96 |
| JBT07 | 8/22/2017 | 1 | 226 | 135.7 | 3.37 |
| JBT07 | 8/30/2017 | 1 | 52 | 32.6 | N.S.B |
| JBT07 | 9/12/2017 | 1 | 168.5 | 89.5 | N.S.B |
| JBT07 | 9/12/2017 | 2+3 | 106 | 77.3 | N.S.B |
| JBT07 | 9/19/2017 | 1 | 51.8 | 19.1 | 3.06 |
| JBT07 | 9/26/2017 | 1 | 100.8 | 32.3 | N.S.B |
| JBT07 | 10/10/2017 | 1 | 304 | 124.5 | N.S.B |
| JBT07 | 10/17/2017 | 1 | 39.6 | 21.4 | 2.04 |
| A: Broken at lab; B: TN analyzed on alternate weeks | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT11 | 4/11/2017 | 1 | 39.5 | 57.8 | 3.35 |
| JBT11 | 4/18/2017 | 1 | 11.5 | 16.2 | 2.59 |
| JBT11 | 4/25/2017 | 1 | 14.7 | 9.73 | 2.45 |
| JBT11 | 5/2/2017 | 1 | 46.5 | 16.1 | 2.04 |
| JBT11 | 5/9/2017 | 1 | 28.8 | 12 | 1.63 |
| JBT11 | 5/9/2017 | 2 | 39 | 12.9 | 1.53 |
| JBT11 | 5/16/2017 | 1 | 31.2 | 23.1 | 1.24 |
| JBT11 | 5/23/2017 | 1 | 234 | 28.8 | 1.24 |
| JBT11 | 5/30/2017 | 1 | 18.1 | 9.58 | 0.81 |
| JBT11 | 6/7/2017 | 1 | 18.6 | 6.46 | 0.91 |
| JBT11 | 6/13/2017 | 1 | 49.7 | 17.2 | 1.29 |
| JBT11 | 6/22/2017 | 1 | 68.8 | 26.4 | 0.77 |
| JBT11 | 6/27/2017 | 1 | 61.5 | 29.2 | 1.48 |
| JBT11 | 6/27/2017 | 2 | 89.8 | 48 | 1.59 |
| JBT11 | 6/27/2017 | 3 | 77.1 | 51.4 | 1.54 |
| JBT11 | 6/27/2017 | 4 | 81.4 | 44 | 1.51 |
| JBT11 | 6/30/2017 | 1 | 30.3 | 17.9 | 1.11 |
| JBT11 | 6/30/2017 | 2 | 24.8 | 17.9 | 1.01 |
| JBT11 | 6/30/2017 | 3 | 24 | 16.8 | 1.05 |
| JBT11 | 6/30/2017 | 4 | 23.3 | 16 | 1.06 |
| JBT11 | 7/5/2017 | 1 | 21.2 | 16.8 | 1.16 |
| JBT11 | 7/11/2017 | 1 | 28.1 | 19.5 | 1.3 |
| JBT11 | 7/18/2017 | 1 | 33.5 | 64.4 | 1.22 |
| JBT11 | 7/26/2017 | 1 | 15.4 | 26 | 0.96 |
| JBT11 | 8/1/2017 | 1 | 59.1 | 35.2 | 1.23 |
| JBT11 | 9/5/2017 | 1 | 92.6 | 45.2 | 1.13 |
| JBT11 | 9/12/2017 | 1+2 | 419.5 | 411 | N.S.B |
| JBT11 | 9/19/2017 | 1 | 77.9 | 38.1 | 1.20 |
| JBT11 | 9/26/2017 | 1 | 126.9 | 34.9 | N.S.B |
| JBT11 | 10/3/2017 | 1 | 26 | 14.1 | 0.19 |
| JBT11 | 10/11/2017 | 1 | 255.6 | 202.5 | N.S.B |
| JBT11 | 10/17/2017 | 1 | 92.5 | 77.8 | 0.81 |
| B: TN analyzed on alternate weeks | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT13 | 4/18/2017 | 1 | 63.8 | 23.2 | 6.12 |
| JBT13 | 4/25/2017 | 1 | 113 | 26.1 | 6.44 |
| JBT13 | 5/2/2017 | 1 | 560 | 41.1 | 5.25 |
| JBT13 | 5/9/2017 | 1+2 | 120 | 35.7 | 6.1 |
| JBT13 | 5/16/2017 | 1 | 35295 | N.S.A | 217.21 |
| JBT13 | 5/23/2017 | 1 | 3720 | 2525 | 17.2 |
| JBT13 | 5/30/2017 | 1 | 2975 | 2070 | 14.08 |
| JBT13 | 6/7/2017 | 1 | 3585 | 2240 | 19.08 |
| JBT13 | 6/13/2017 | 1 | 815 | 489.5 | 7.97 |
| JBT13 | 6/22/2017 | 1 | 912 | 585 | 8.94 |
| JBT13 | 6/27/2017 | 1 | 525 | 218 | 21.83 |
| JBT13 | 6/27/2017 | 2 | 384.8 | 137 | 12.71 |
| JBT13 | 7/5/2017 | 1 | 312 | 143 | 28.87 |
| JBT13 | 7/5/2017 | 2 | 87.1 | 70.5 | 14.03 |
| JBT13 | 7/11/2017 | 1 | 350.4 | 191 | 12.15 |
| JBT13 | 7/18/2017 | 1 | 95.3 | 94.8 | 16.97 |
| JBT13 | 7/26/2017 | 1 | 127 | 118 | 10.2 |
| JBT13 | 8/8/2017 | 1 | 248 | 148 | N.S.B |
| JBT13 | 8/15/2017 | 1 | 336 | 196 | 5.29 |
| JBT13 | 8/22/2017 | 1 | 274.5 | 138.5 | 7.74 |
| JBT13 | 8/30/2017 | 1 | 272 | 94.1 | N.S.B |
| JBT13 | 9/5/2017 | 1 | 139 | 70.8 | 2.87 |
| JBT13 | 9/12/2017 | 1+2 | 202 | 149 | N.S.B |
| JBT13 | 9/19/2017 | 1 | 104.8 | 57.7 | 5.94 |
| JBT13 | 9/26/2017 | 1 | 86.8 | 46.4 | N.S.B |
| JBT13 | 10/3/2017 | 1 | 99.1 | 61.5 | 1.86 |
| JBT13 | 10/11/2017 | 1 | 612 | 172C | N.S.B |
| JBT13 | 10/17/2017 | 1 | 178 | 115 | N.S.B |
| A: Broken at lab; B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT14 | 4/11/2017 | 1 | 248 | 66.5 | 7.43 |
| JBT14 | 4/18/2017 | 1 | 70.5 | 33.2 | 8.25 |
| JBT14 | 4/25/2017 | 1 | 145 | 51.5 | 7.62 |
| JBT14 | 4/25/2017 | 2 | 46.3 | 35.2 | 8.22 |
| JBT14 | 5/2/2017 | 1 | 342 | 59.3 | 7.2 |
| JBT14 | 5/9/2017 | 1+2 | 177 | 51.1 | 7.12 |
| JBT14 | 5/16/2017 | 1 | 4335 | 1640 | 51.21 |
| JBT14 | 5/23/2017 | 1 | 690 | 183 | 9.66 |
| JBT14 | 5/30/2017 | 1 | 78.2 | 75.7 | 7.72 |
| JBT14 | 6/7/2017 | 1 | 138 | 143 | 19.95 |
| JBT14 | 6/13/2017 | 1+2 | 73.6 | 60.1 | 9.89 |
| JBT14 | 6/22/2017 | 1 | 189 | 132 | 11.88 |
| JBT14 | 6/27/2017 | 1 | 482 | 208 | 31.95 |
| JBT14 | 6/27/2017 | 2 | 618 | 345 | 22.75 |
| JBT14 | 6/27/2017 | 3 | 246 | 216 | 19.91 |
| JBT14 | 6/30/2017 | 1 | 436 | 210 | 56.87 |
| JBT14 | 6/30/2017 | 2 | 220 | 162 | 34.23 |
| JBT14 | 7/5/2017 | 1 | 95.9 | 86.4 | 16.81 |
| JBT14 | 7/5/2017 | 2 | 90.4 | 74.1 | 14.07 |
| JBT14 | 7/11/2017 | 1 | 103 | 87.4 | 13.35 |
| JBT14 | 7/18/2017 | 1 | 88.3 | 102 | 14.87 |
| JBT14 | 7/26/2017 | 1 | 69.4 | 79.3 | 12.9 |
| JBT14 | 8/1/2017 | 1 | 59.7 | 73.6 | 11.8 |
| JBT14 | 8/30/2017 | 1 | 350 | 238.5 | N.S.B |
| JBT14 | 9/5/2017 | 1 | 309 | 251.4 | 4.97 |
| JBT14 | 9/12/2017 | 1+2 | 162 | 107 | N.S.B |
| JBT14 | 9/19/2017 | 1 | 52.9 | 26.1 | 7.84 |
| JBT14 | 9/26/2017 | 1 | 37.5 | 29 | N.S.B |
| JBT14 | 10/3/2017 | 1 | 82 | 67.7 | 4.95 |
| JBT14 | 10/11/2017 | 1 | 776 | 150 | N.S.B |
| JBT14 | 10/11/2017 | 2 | 481.5 | 206 | N.S.B |
| JBT14 | 10/11/2017 | 3 | 340.5 | 184 | N.S.B |
| JBT14 | 10/11/2017 | 4 | 133.8 | 91 | N.S.B |
| JBT14 | 10/17/2017 | 1 | 67.3 | 49.5 | N.S.B |
| B: TN analyzed on alternate weeks | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT16 | 4/11/2017 | 1 | 105 | 72.7 | 5.77 |
| JBT16 | 4/18/2017 | 1 | 28.2 | 22.4 | 5.12 |
| JBT16 | 4/25/2017 | 1 | 28.5 | 21.5 | 4.48 |
| JBT16 | 5/2/2017 | 1 | 256.2 | 25.5 | 3.89 |
| JBT16 | 5/9/2017 | 1+2 | 31.3 | 13.7 | 2.79 |
| JBT16 | 5/16/2017 | 1 | 19.4 | 13.3 | 2.89 |
| JBT16 | 5/23/2017 | 1 | 26.2 | 17 | 2.96 |
| JBT16 | 5/30/2017 | 1 | 26.7 | 17.7 | 2.62 |
| JBT16 | 6/7/2017 | 1 | 25.9 | 9.56 | 3.68 |
| JBT16 | 6/13/2017 | 1 | 29.4 | 17.4 | 3.44 |
| JBT16 | 6/22/2017 | 1 | 85.9 | 32.9 | 5.81 |
| JBT16 | 6/26/2017 | 1+2 | 89.2 | 44.1 | 21.99 |
| JBT16 | 7/5/2017 | 1 | 41 | 28.9 | 14.85 |
| JBT16 | 7/5/2017 | 2+3 | 34.3 | 27.6 | 12.43 |
| JBT16 | 7/11/2017 | 1 | 32.8 | 29.8 | 9.75 |
| JBT16 | 7/18/2017 | 1 | 35.4 | 22.3 | 8.4 |
| JBT16 | 7/26/2017 | 1 | 45.9 | 51.7 | 8.87 |
| JBT16 | 8/1/2017 | 1 | 54.7 | 39.1 | 8.52 |
| JBT16 | 8/15/2017 | 1 | 159 | 32.6 | 6.41 |
| JBT16 | 8/22/2017 | 1 | 81.9 | 59.9 | 6.67 |
| JBT16 | 8/30/2017 | 1 | 59.6 | 36.8 | N.S.B |
| JBT16 | 9/12/2017 | 1+2 | 84.1 | 48.5 | N.S.B |
| JBT16 | 9/19/2017 | 1 | 63.5 | 35.3 | 5.66 |
| JBT16 | 10/10/2017 | 1 | 1025 | 630C | N.S.B |
| JBT16 | 10/17/2017 | 1 | 169 | 133 | 7.09 |
| B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection | | | | | |

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| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT18 | 4/25/2017 | 1 | 87.4 | 46.1 | 1.16 |
| JBT18 | 5/2/2017 | 1 | 170 | 42.3 | 1.26 |
| JBT18 | 5/9/2017 | 1 | 140 | 40.1 | 1.13 |
| JBT18 | 5/9/2017 | 2 | 77.5 | 37.5 | 0.99 |
| JBT18 | 5/9/2017 | 3 | 159 | 32.5 | 1.06 |
| JBT18 | 5/9/2017 | 4 | 199 | 38.6 | 1.1 |
| JBT18 | 5/16/2017 | 1 | 80.8 | 35.9 | 0.71 |
| JBT18 | 5/23/2017 | 1 | 49.7 | 16 | 0.78 |
| JBT18 | 5/30/2017 | 1 | 89.1 | 23 | 0.95 |
| JBT18 | 6/6/2017 | 1 | 46.5 | 8.59 | 0.79 |
| JBT18 | 6/13/2017 | 1 | 160 | 31.1 | 1.25 |
| JBT18 | 6/22/2017 | 1 | 71.2 | N.S.A | 1.33 |
| JBT18 | 6/30/2017 | 1 | 260.5 | 57.2 | 2.04 |
| JBT18 | 6/30/2017 | 2 | 234 | 71.5 | 1.9 |
| JBT18 | 6/30/2017 | 3 | 206 | 58.9 | 1.61 |
| JBT18 | 6/30/2017 | 4 | 142 | 57.9 | 1.38 |
| JBT18 | 7/5/2017 | 1+2+3+4 | 143 | 74.4 | 0.98 |
| JBT18 | 7/11/2017 | 1 | 135 | 59.5 | 1.06 |
| JBT18 | 7/18/2017 | 1 | 166 | 183 | 1.15 |
| JBT18 | 7/26/2017 | 1 | 66.5 | 40 | 1.1 |
| JBT18 | 8/1/2017 | 1 | 43.3 | 28.2 | 0.83 |
| JBT18 | 8/8/2017 | 1 | 34.5 | 16.1 | N.S.B |
| JBT18 | 8/22/2017 | 1 | 75.9 | 33.1 | 2.18 |
| JBT18 | 8/30/2017 | 1 | 46.2 | 26.6 | N.S.B |
| JBT18 | 9/5/2017 | 1 | 75.9 | 28.3 | 3.15 |
| JBT18 | 9/12/2017 | 1 | 185.8 | 113.5 | N.S.B |
| JBT18 | 9/12/2017 | 2 | 117 | 71.2 | N.S.B |
| JBT18 | 9/19/2017 | 1 | 64.6 | 26.9 | 0.84 |
| JBT18 | 9/26/2017 | 1 | 180 | 28.6 | N.S.B |
| JBT18 | 10/10/2017 | 1 | 223 | 80.9 | N.S.B |
| JBT18 | 10/17/2017 | 1 | 195 | 47.9 | 1.58 |
| A: Broken at lab; B: TN analyzed on alternate weeks | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Sampling date | Carboy | TP (µg/L) | TDP (µg/L) | TN (mg/L) |
| JBT19 | 4/25/2017 | 1 | 27.2 | 31.7 | 1 |
| JBT19 | 5/2/2017 | 1 | 56 | 21.1 | 1.1 |
| JBT19 | 5/9/2017 | 1 | 40.1 | 29.1 | 0.76 |
| JBT19 | 5/9/2017 | 2 | 20.9 | 12.2 | 0.61 |
| JBT19 | 5/9/2017 | 3+4 | 55.2 | 20.4 | 0.82 |
| JBT19 | 5/16/2017 | 1 | 17.6 | 12.6 | 0.45 |
| JBT19 | 5/23/2017 | 1 | 54.6 | 22.1 | 1 |
| JBT19 | 5/30/2017 | 1 | 21.8 | 10.4 | 0.49 |
| JBT19 | 6/13/2017 | 1 | 81.1 | 23.1 | 0.91 |
| JBT19 | 6/22/2017 | 1 | 151 | N.S.A | 1.24 |
| JBT19 | 6/30/2017 | 1 | 163 | 73.7 | 2.04 |
| JBT19 | 6/30/2017 | 2 | 52.2 | 39.4 | 0.88 |
| JBT19 | 6/30/2017 | 3+4 | 51.8 | 40.9 | 0.94 |
| JBT19 | 7/5/2017 | 1+2+3+4 | 41.4 | 31.3 | 0.71 |
| JBT19 | 7/11/2017 | 1 | 45.3 | 21.8 | 0.57 |
| JBT19 | 7/18/2017 | 1 | 79.3 | 74.2 | 1.05 |
| JBT19 | 7/26/2017 | 1 | 29.3 | 27.5 | 0.73 |
| JBT19 | 8/1/2017 | 1 | 32.8 | 18.7 | 0.58 |
| JBT19 | 8/8/2017 | 1 | 111 | 22.6 | N.S.B |
| JBT19 | 8/30/17 | 1 | 29.1 | 13.8 | N.S.B |
| JBT19 | 9/5/2017 | 1 | 55.5 | 17.4 | 1.92 |
| JBT19 | 9/12/2017 | 1+2 | 62.4 | 28.9 | N.S.B |
| JBT19 | 9/19/2017 | 1 | 62.1 | 12.5 | 0.75 |
| JBT19 | 10/17/2017 | 1 | 208.5 | 16.4 | 1.46 |
| A: Broken at lab; B: TN analyzed on alternate weeks | | | | | |

Figure . Flow rate at the JBT01 tile drain monitoring station