

Appendix S:
Miami Valley
Wastewater Treatment
Facility
Flow Rate Data
Review

October 2022

Miami Valley Wastewater Treatment Facility

Flow Rate Data Review

Report Outline

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 - b. Provide underlying data for consideration of FPA boundary changes
 - c. Provide additional data for the enhanced regional rate survey
 - d. Support planning for the effects of Climate Change
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Section 1: Purpose of this Data Review

The Miami Valley Regional Planning Commission (MVRPC) was designated by the governor of Ohio in 1974 as the Areawide Water Quality Planning Agency for Darke, Greene, Miami, Montgomery, and Preble Counties. Under contract with Ohio EPA, MVRPC performs water quality planning work in support of Ohio's delegated water quality protection program under the Clean Water Act. The core of this work is maintenance of the Areawide Water Quality Management Plan (AWQMP), and its inventory of wastewater treatment Facility Planning Areas (FPA).

An FPA is the geographic area associated with each wastewater treatment facility within which the facility's Designated Management Agency (DMA) is responsible for the planning, financing, construction, maintenance, and operation of wastewater collection and treatment systems. A DMA is usually, but not always, a unit of local government: a city, village or county. The DMA maintains a facility plan that is expected to project future growth within the FPA, and plan for necessary expansion of wastewater collection and treatment infrastructure to effectively manage wastewater flows from development in order to protect water resources. Best practice is to ensure the facility plan correlates with the community comprehensive plan; so that infrastructure investments are projected in locations the community foresees growth. The facility plan may indicate where wastewater infrastructure will and will not be constructed, as a signal to the development community about projected development location and expected development form.

The purpose of this data review is to support ongoing program and planning efforts related to wastewater treatment at the FPA level. These efforts include:

Reviews of Permit to Install (PTI) Applications. Ohio EPA receives on a daily basis applications from communities and developers for permits to construct new (or replacement) wastewater infrastructure to support new residential, commercial, industrial and institutional development. PTI applications are also submitted by DMAs for capacity or technology upgrades to wastewater treatment facilities. New sanitary sewer lines to new development will result in additional wastewater flows to the treatment facility. This data review provides context regarding the average and peak flow rates to the facilities over a recent five-year period, and can assist permit reviewers in determining the available capacity for treatment at the receiving facility.

FPA Boundary Updates. From time to time a DMA will request a change to the FPA boundary to accommodate new areas of development, or sometimes just a single development. These boundary changes may include locations not previously inside any FPA or locations currently inside an adjacent FPA. This data review can provide context for consideration of these boundary updates, particularly on the question of the planning and capacity for serving the proposed new area for the FPA.

Regional Water and Sewer Rate Survey. Communities across the Miami Valley contribute information on water and sewer rates for an annual survey, published currently by the City of Piqua. The survey provides a comparison between communities on rates charged to customers for water and sewer services. In an effort to give a more apples-to-apples comparison, the City of Piqua is looking to provide greater depth of information about the services and facilities the rates are supporting. This data review may contribute to the data comparisons.

Support planning for the effects of Climate Change. Increased precipitation and increased frequency of large precipitation events are forecasted effects of human-caused climate warming due to increased greenhouse gases in the atmosphere.¹ This is true nationally as well as in the Midwest. Though the Miami Valley has no communities with combined storm and sanitary sewers, it is still known that precipitation events increase flows to wastewater treatment facilities. The data in this report can assist in developing a baseline assessment of Flow Rate when considering projects for adaptation to future precipitation rates.

It is important to state that a review of Flow Rate data does not and cannot provide any assessment of operations at a wastewater treatment facility. This assessment is more about factors outside the facility itself – factors those managing these plants do not or cannot have any control over. The pace and form of local development and trends in precipitation are key factors in the Flow Rate figures reported by these facilities.

Nor can Flow Rate data alone indicate with certainty the best approach to address facilities that are routinely operating near or even above their Design Flow capacity. That determination would require specific local knowledge and consideration of other engineering factors. According to the U.S. EPA there are a variety of options for facilities to improve peak flow management. Approaches for increasing storage capacity, decreasing influent, or increasing treatment capacity by chemical or mechanical means can be mixed and matched depending on a facility's current design and operations. Understanding the sanitary sewer services area, flows generated during peak events, operational procedures, permit limits and monitoring requirements, and the treatment technology will all be parts of developing a plan for ensuring adequate capacity into the future.²

MVRPC is aware of planned projects for addressing capacity issues at facilities in Troy, New Madison, and Tri-Cities. An Infiltration and Inflow reduction project was implemented in the Village of Yellow Springs in 2018-2019. In section 4 of this report, a case study on the Yellow Springs project highlights the outcomes of that work.

What this planning-level data can do is help identify communities where future growth may be limited or delayed by the inadequate capacity of the existing treatment facility. These communities should be encouraged to coordinate community development plans with engineering and financial plans now to ensure wastewater flows can be treated for the protection of water resources. This could be accomplished by limiting community development, or by enlarging the treatment facility's capacity, or a combination of both. The path to take is a community planning decision.

Section 2: Data Review Methodology

To protect Ohio's water resources, Ohio EPA issues National Pollutant Discharge Elimination System (NPDES) permits to any entity that discharges waste into Ohio's rivers, lakes or streams. These permits authorize the discharge of substances at levels that meet water quality standards and establish other conditions related to issues such as sanitary sewer overflows, pretreatment and sludge disposal. Limits for pollution discharge are set based on the receiving capacity of the stream (based on Ohio EPA monitoring), and any applicable federal or state regulations. As a condition of their permits from the Ohio EPA, wastewater treatment plant

¹ [National Climate Assessment 2018, Chapter 21: Midwest, Key Message 5: Transportation and Infrastructure.](#)

² Wastewater Management Fact Sheet, U.S. EPA Office of Water (EPA 832-F-07-016) September 2007.

operators collect and report a great deal of data about plant operations and the pollution levels of the plants' effluent.

This data review uses Flow Rate data as a percentage of Design Flow as a planning level indicator of a plant's current available capacity for growth. **Flow Rate** is a parameter which is required in all facility permits to be reported daily. It is a measure of the total volume of wastewater processed by the facility for the day. Flow Rate is measured in Millions of Gallons per Day (MGD). **Design Flow** is an engineering calculation of the capacity of the facility to receive, process, and discharge wastewater on a daily basis. The Design Flow is used in the calculations of pollution limits set by the plant's NPDES permit, and is recorded in the permit terms.³ Design flow is also measured in Millions of Gallons per Day (MGD).

For example, a facility with a Design Flow of 1 MGD (1,000,000 gallons per day) reports a Flow Rate for a single day of 0.65 MGD (650,000 gallons). For that day, the facility is operating at 65 percent of capacity. A single day is not a large enough sample size to assess typical Flow Rates, so for this data review five years of Flow Rate reports were reviewed for each facility. Five years allows for annual and monthly variations in weather, to be averaged out over time. It should be noted that for this review the period of the COVID-19 pandemic is included, which may have shifted wastewater loads between residential, commercial and industrial loads. That said, no attempt is made in this review to detect or measure any affect from the pandemic.

As stated above, Flow Rate as a percentage of Design Flow is used as a proxy for utilized and available capacity at each wastewater treatment facility. Ohio EPA regards plants operating at 80 percent of capacity or higher as likely candidates for projects to upgrade capacity or reduce "Infiltration & Inflow" into the system. It is known that all facilities' Flow Rates are influenced by the weather, specifically precipitation. Rain and melting snow are known to infiltrate wastewater collection systems. No attempt was made in this review to correlate precipitation data with Flow Rate data. Therefore, for facilities operating near (or above) their Design Flow determination of the best approaches for addressing plant operations will need local knowledge and additional study, beyond this data review.

Data Sources and Processing

Ohio EPA provided reported Flow Rate data for all wastewater treatment facilities in the MVRPC coverage area for a five year period in spreadsheet format. Data for wastewater treatment facilities in St. Henry (Mercer County), Clark County Southwest Regional, and Franklin Regional (Warren County) was also provided because these facilities serve communities within the MVRPC planning counties. The data included the date and reported flow (in MGD) for approximately 1,826 days from May 2017 through April 2022. The data also included the number of days for which the facility reported a Sanitary Sewer Overflow (SSO) through the period, however this data was not assessed as SSO's are not attributable with certainty to plant capacity issues.

The daily Flow Rate data was aggregated to determine monthly and annual averages. Further the daily data was converted into a percentage of Design Flow and graphed so that facilities can be compared on a common metric, regardless of size. This data was used to calculate the number of days during which the facility operated above 80 percent, 100 percent, and 120 percent of design flow capacity.

³ Design Flow is a standard data point in permits issued by Ohio EPA's Southwest District Office.

Calculation of the average Flow Rate over the five year period was done by determining the mean Flow Rate and standard deviation of the Flow Rate data. All data more than two standard deviations from the mean (typically only on the high end) were excluded from the calculation of average Flow Rate. This has the effect of filtering out extreme days to give a fairer picture of typical operating conditions at the facility.

For each facility assessed, this report provides a graph of daily flows, as well as a narrative summary of the data. Summary “bubble” graphs of all facilities are also provided which sort the facilities into tiers based on percent of utilized capacity. Color coded points indicate facilities for which there is an immediate concern (red), facilities “on watch” (amber), and facilities with no immediate concern (green).

Since August 2015, MVRPC staff has routinely reviewed PTI applications received by the Ohio EPA Southwest District Office (SWDO) for new or replacement sanitary sewer infrastructure, new on site wastewater treatment systems, and improvements to wastewater treatment facilities. These reviews are made to confirm consistency with the wastewater prescriptions in the Areawide Water Quality Management Plan. Basic information about the PTI applications is captured and the location of the PTI project has been mapped for over 550 reviews. These reviews have been categorized by FPA and included as an additional level of review for wastewater treatment facilities listed in the amber and red tiers, described above.

All data used in this report is available upon request from the Miami Valley Regional Planning Commission. Contact Matt Lindsay, Manager of Environmental Planning to request the data.

Section 3: Data Review Findings

How to read the Daily Data graphs. For each wastewater treatment facility, this review provides a daily data graph and narrative summary of the findings regarding Flow Rate data. The data presented in the graph is not shown in chronological order, but rather is sorted from least to most. This presentation allows the reader to get a visual understanding of typical days, and the number of days above and below 100 percent of design flow. The marks along the X-axis divide the reporting days into quintiles, which in this case represent about 365 days of Flow Rate reports in each quintile. The X-axis label also indicates the number of days for which the Facility reported a Flow Rate.

The graphs are grouped by HUC-8, since facilities in each group contribute pollution loadings to a common watershed.

How to Read the Summary Bubble Charts. MVRPC staff pulled data from each facility's data review to plot comparison charts. The charts allow visual comparison between facilities by plotting the following data:

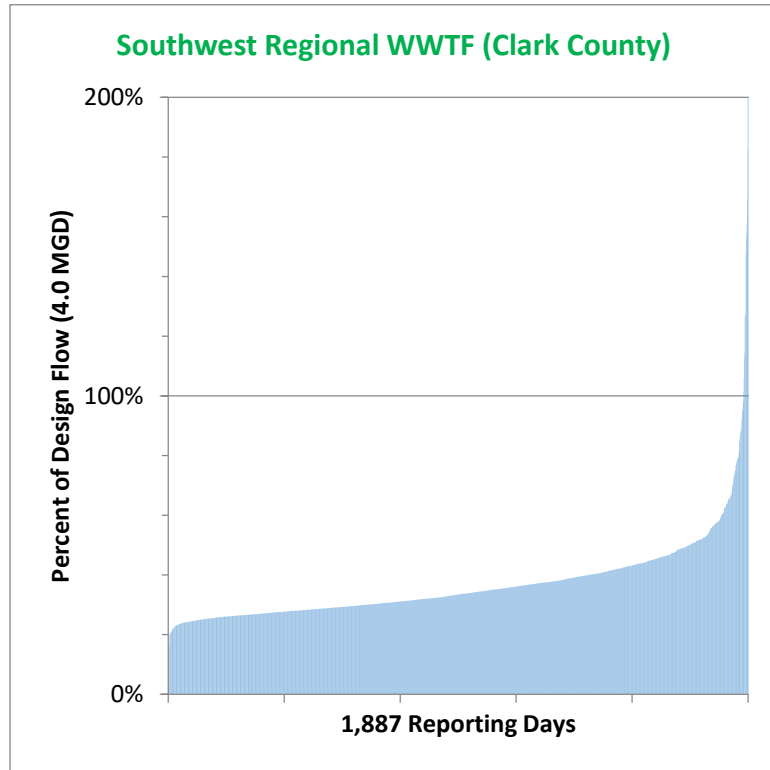
Axes	Data Represented
X-Axis	Percent of Days the Facility operated above 80 percent of Design Flow
Y-Axis	Average percent of Design Flow over full study period
Z - Bubble Size	Design Flow of the facility

Because facility Design Flows range between 0.015 MGD and 72 MGD, the bubble charts are divided between Minor and Major facilities, based on which category Ohio EPA assigned them in the NPDES permitting process. The dividing line between minor and major facilities is 1 MGD.

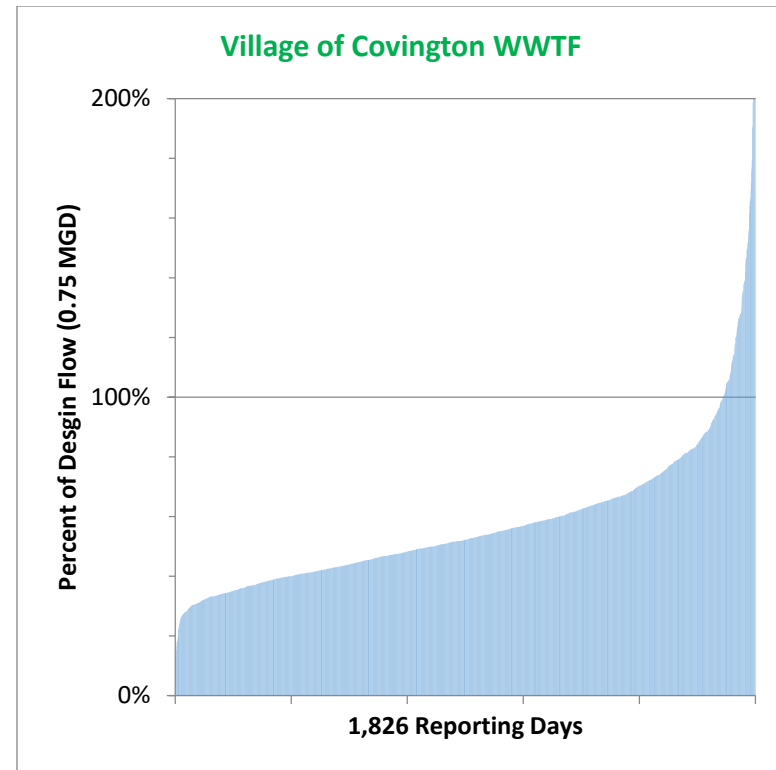
MVRPC staff further categorized the facilities in the bubble charts by data in the Y-Axis (Average percent of Design Flow). Facilities averaging below 60 percent of Design Flow were considered to have no issues and shown in green. Those between 60 percent and 80 percent are considered are on watch and shown in amber. Facilities averaging over 80 percent of Design Flow are listed as having immediate issues and shown in red.

Finally, the facility points are mapped with their color-coding by watershed, to give a visual understanding of the concerns across the region.

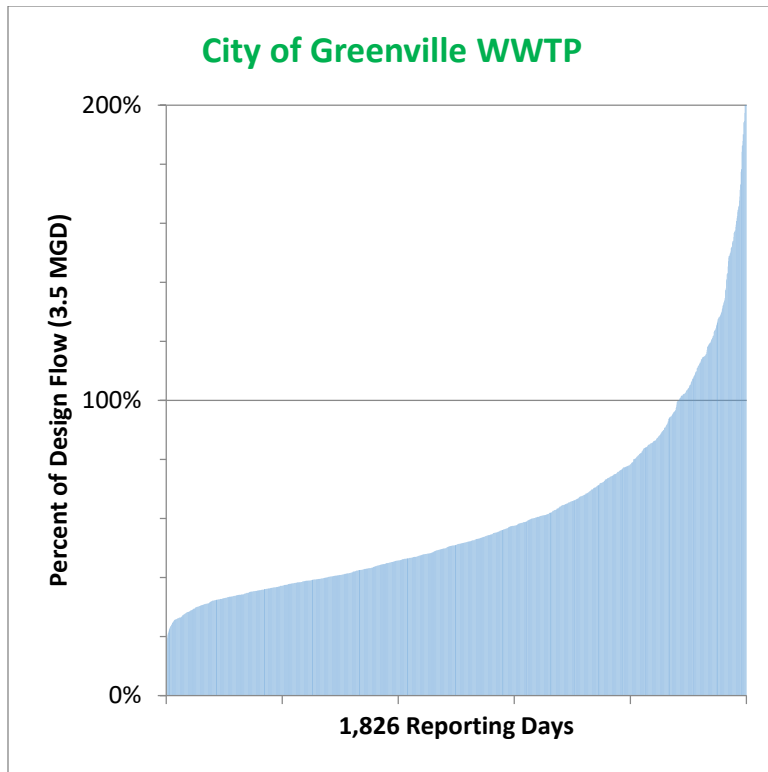
Middle Great Miami River Watershed (05080001)



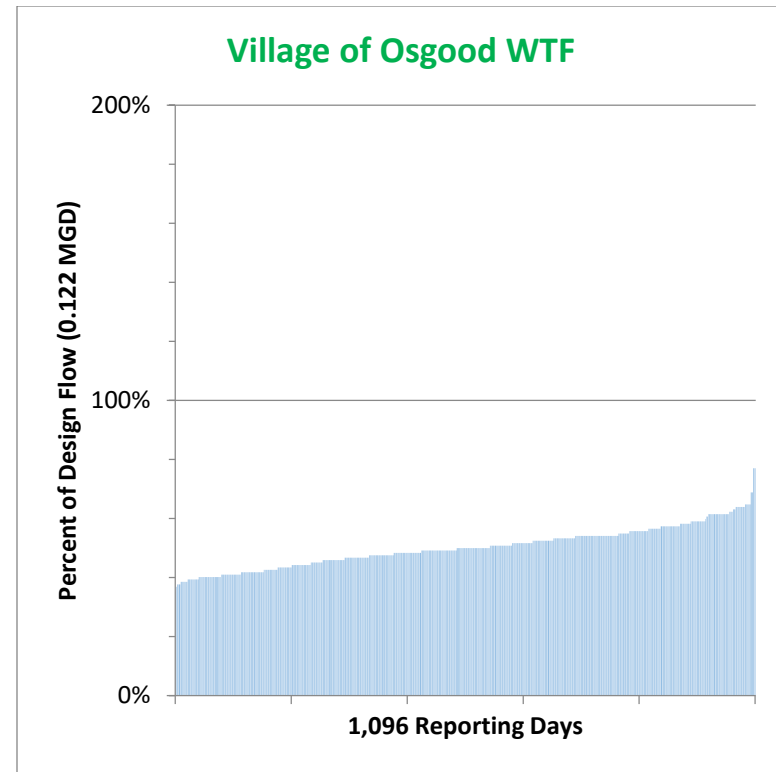
With a design flow of 4.0 MGD and a mean reported flow of 1.41 MGD (excluding outliers) Clark County's Southwestern Regional WWTF is typically experiencing flow rates at 35 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 1.3 and 1.6 MGD. No months from May 2017 through June 2022 exceeded 2.64 MGD on a monthly average. Since May of 2017 there have been 33 individual days (1.7% of days) during which reported flow exceeded 3.2 MGD (80% of capacity). There were 17 days since May 2017 during which the reported flow exceeded 4.0 MGD (100% of capacity), and of these 13 days exceeded 4.8 MGD (120% of capacity). The facility reported 3 days above 200% of capacity.



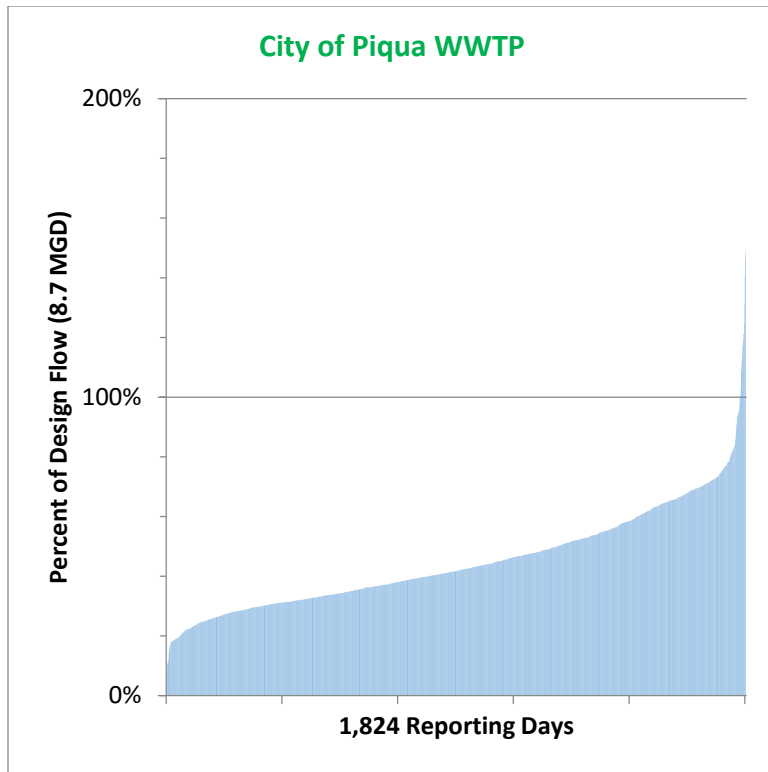
With a design flow of 0.75 MGD and a mean reported flow of 0.41 MGD (excluding outliers) the Village of Covington WWTP is typically experiencing flow rates at 54 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.39 and 0.45 MGD. No months from May 2017 through April 2022 exceeded 0.75 MGD on a monthly average. Since May of 2017 there have been 232 individual days (13% of days) during which reported flow exceeded 0.6 MGD (80% of capacity). There were 103 days since May 2017 during which the reported flow exceeded 0.75 MGD (100% of capacity) and of these 64 exceeded 0.9 MGD (120% of capacity). The facility reported eight days with flow above 200% of capacity.



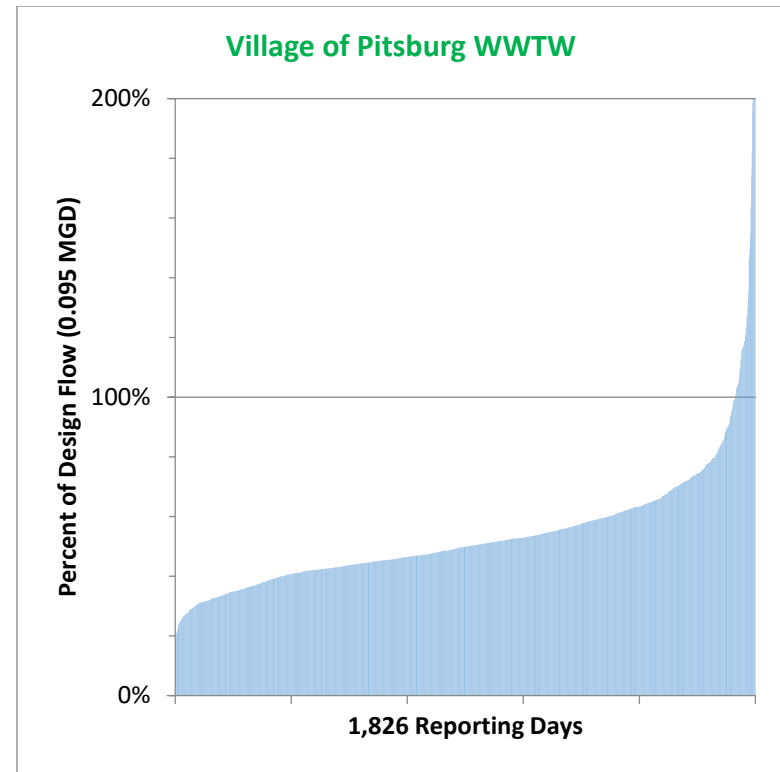
With a design flow of 3.5 MGD and a mean reported flow of 1.95 MGD (excluding outliers) the Greenville WWTP is typically experiencing flow rates at 56 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 1.8 and 2.6 MGD. Two months from May 2017 through April 2022 exceeded 3.5 MGD on a monthly average. Since May of 2017 there have been 357 individual days (20% of days) during which reported flow exceeded 2.8 MGD (80% of capacity). There have been 214 individual days since May 2017 during which the reported flow exceeded 3.5 MGD (100%) and 113 of these exceeded 4.2 MGD (120%). The facility reported five days with flows above 200% of design flow.



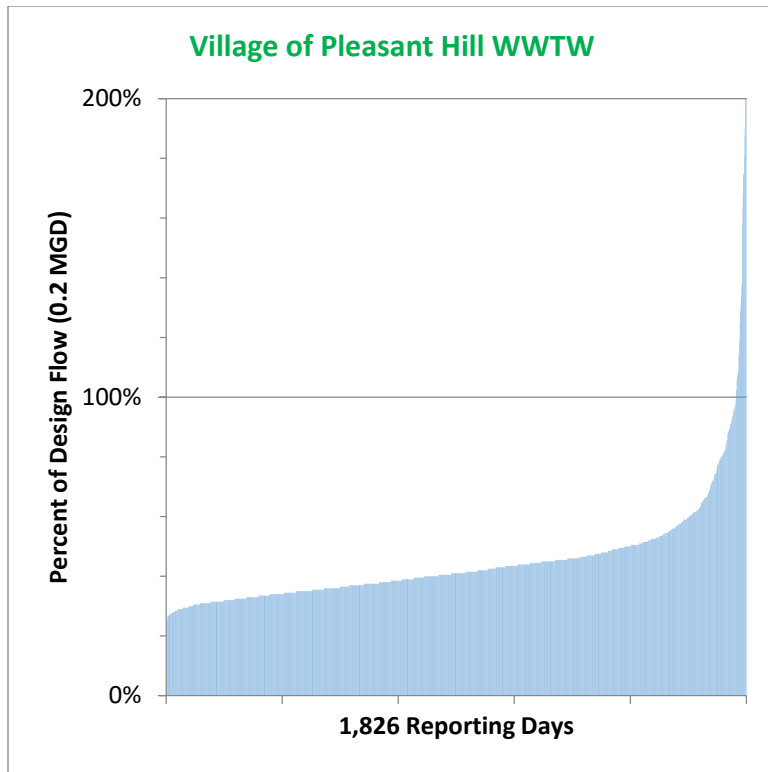
The Village of Osgood WWTP serves Osgood as well as the villages of North Star and Yorkshire. The minor NPDES permit for this facility specifies a Design Flow of 0.122 MGD. The only source of flow data is Influent Flow Rate reporting (Station 601). Based on that reporting the facility typically experiences flows of 0.061 MGD, representing 50 percent of design flow (excluding high and low outliers). On no day between May 2019 and April 2022 did reported flow exceed 0.094 MGD (77% of Design Flow). This may not be an apples-to-apples comparison with other Miami Valley WWTF.



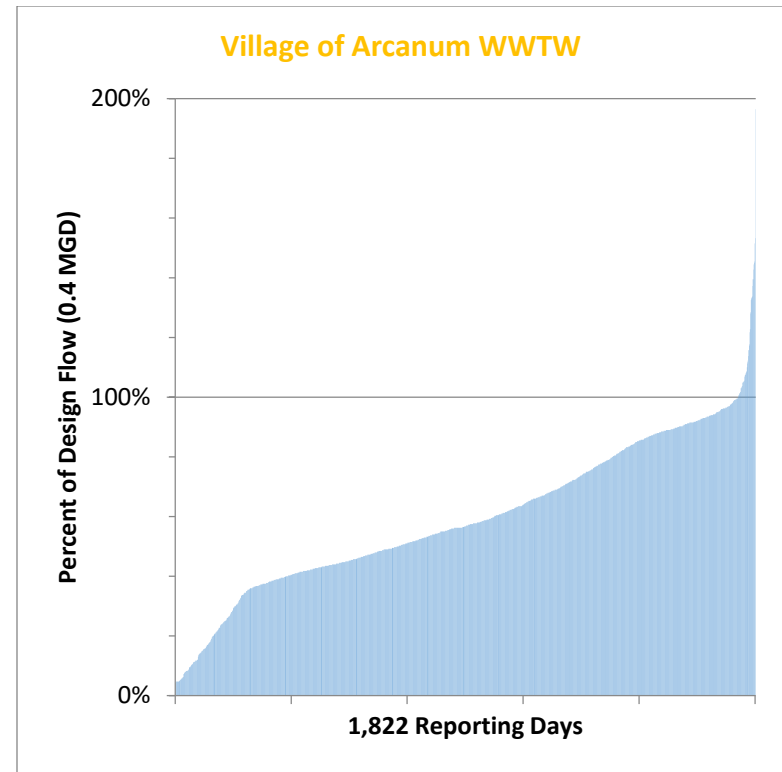
With a design flow of 8.7 MGD and a mean reported flow of 5.06 MGD (excluding low and high outliers) the Piqua WWTP is typically experiencing flow rates at 58 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 3.6 and 4.0 MGD. No months from May 2017 through April 2022 exceeded 6.2 MGD on a monthly average. Since May of 2017 there have been 49 individual days (3% of days) during which reported flow exceeded 6.96 MGD (80% of capacity). There have been 19 individual days since May 2017 during which the reported flow exceeded 8.7 MGD (100%) and 8 of these exceeded 10.44 MGD (120%).



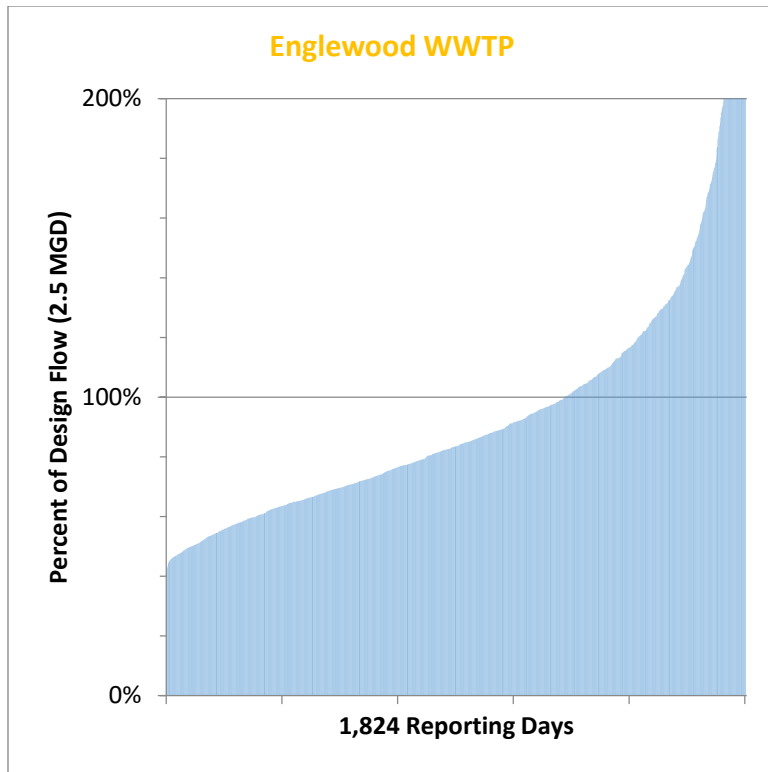
With a design flow of 0.095 MGD and a mean reported flow of 0.049 MGD (excluding outliers) the Village of Pittsburg WWTP is typically experiencing flow rates at 52 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.048 and 0.055 MGD. Just one of sixty months from May 2017 through April 2022 exceeded 0.095 MGD on a monthly average. Since May of 2017 there have been 129 individual days (7% of days) during which reported flow exceeded 0.076 MGD (80% of capacity). There were 64 days since May 2017 during which the reported flow exceeded 0.095 MGD (100% of capacity) and of these 34 exceeded 0.114 MGD (120% of capacity). The facility reported nine days with flow above 200% of capacity.



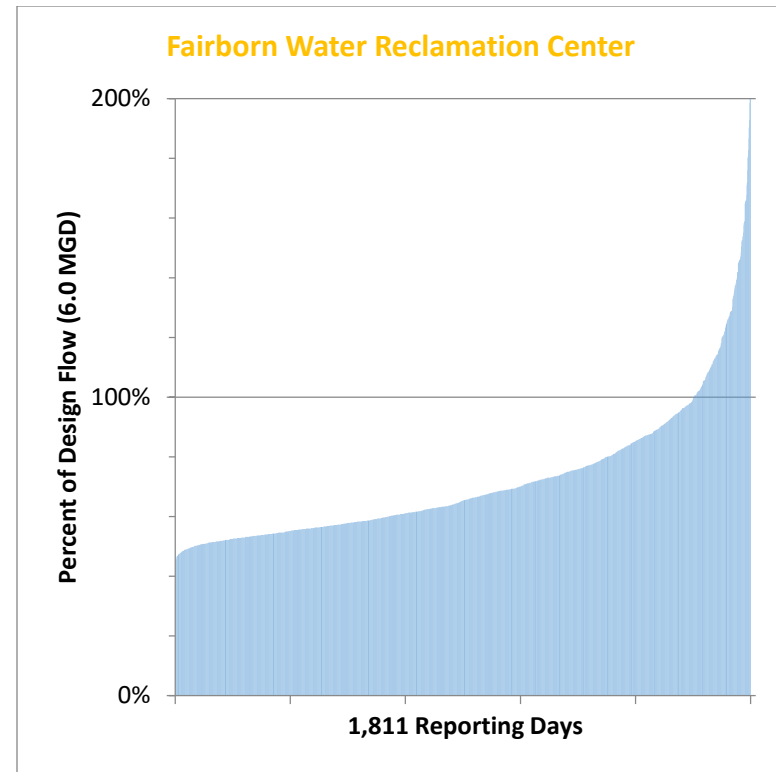
With a design flow of 0.2 MGD and a mean reported flow of 0.085 MGD (excluding outliers) the Village of Pleasant Hill WWTW is typically experiencing flow rates at 43 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.07 and 0.11 MGD. No months from May 2017 through April 2022 exceeded 0.2 MGD on a monthly average. Since May of 2017 there have been 77 individual days (4% of days) during which reported flow exceeded 0.16 MGD (80% of capacity). There were 34 days since May 2017 during which the reported flow exceeded 0.2 MGD (100% of capacity) and of these 22 exceeded 0.24 MGD (120% of capacity). The facility reported five days with flow above 200% of capacity.



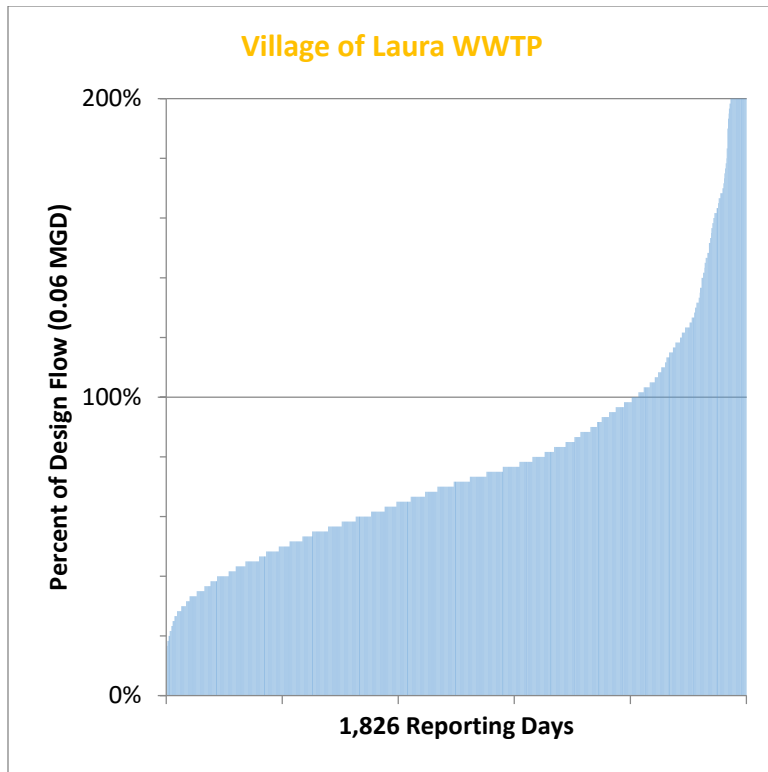
With a design flow of 0.4 MGD and a mean reported flow of 0.24 MGD (excluding outliers) the Village of Arcanum WWTW is typically experiencing flow rates at 60 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.18 and 0.25 MGD. Just one of sixty months from May 2017 through April 2022 exceeded 0.4 MGD on a monthly average. Since May of 2017 there have been 448 individual days (25% of days) during which reported flow exceeded 0.32 MGD (80% of capacity). There were 55 days since May 2017 during which the reported flow exceeded 0.4 MGD (100% of capacity) and of these 19 exceeded 0.48 MGD (120% of capacity). The facility reported zero days with flow above 200% of capacity.



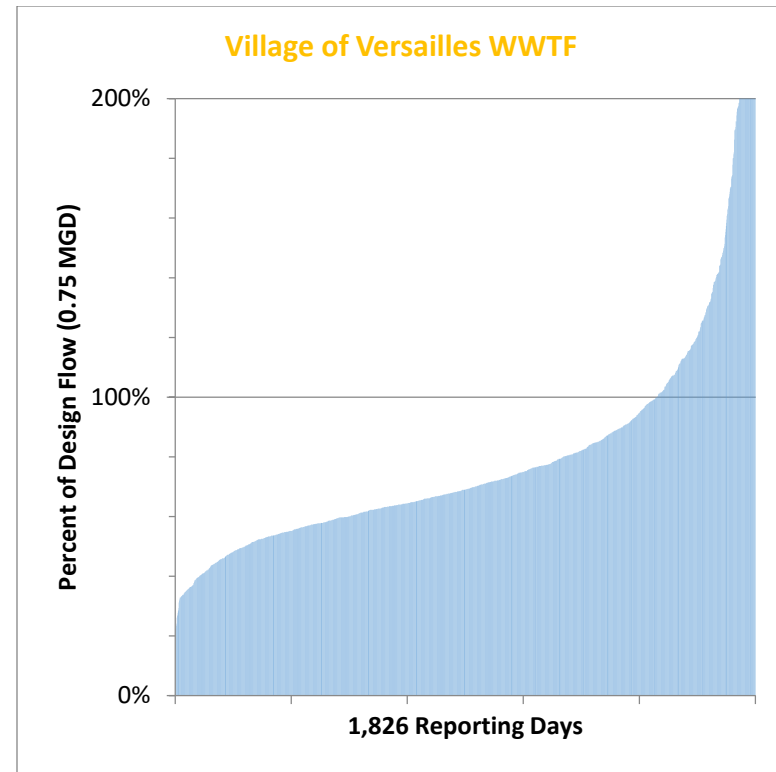
With a design flow of 2.5 MGD and a mean reported flow of 1.78 MGD (excluding outliers) the Englewood WWTP is typically experiencing flow rates at 71 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 2.2 and 2.44 MGD. Twenty-seven of sixty months from May 2017 through April 2022 exceeded 2.5 MGD on a monthly average. Since May of 2017 there have been 1,006 individual days (55% of days) during which reported flow exceeded 2.0 MGD (80% of capacity). There have been 571 individual days since May 2017 during which the reported flow exceeded 2.5 MGD (100%) and 339 of these exceeded 3.0 MGD (120%). The facility reported 71 days above 200% of capacity.



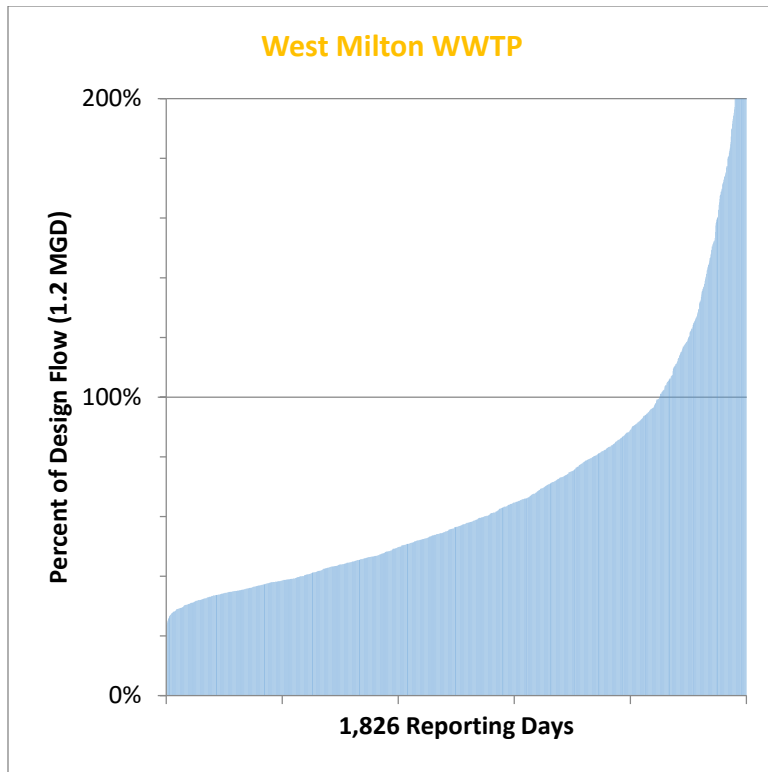
With a design flow of 6.0 MGD and a mean reported flow of 4.1 MGD (excluding outliers) the Fairborn WRC is typically experiencing flow rates at 68 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 3.7 and 4.7 MGD. Four months from May 2017 through April 2022 exceeded 6.0 MGD on a monthly average. Since May of 2017 there have been 451 individual days (25% of days) during which reported flow exceeded 4.8 MGD (80% of capacity). There have been 180 individual days since May 2017 during which the reported flow exceeded 6.0 MGD (100%) and 91 of these exceeded 7.2 MGD (120%). The facility reported four days with flow above 200% of design flow.



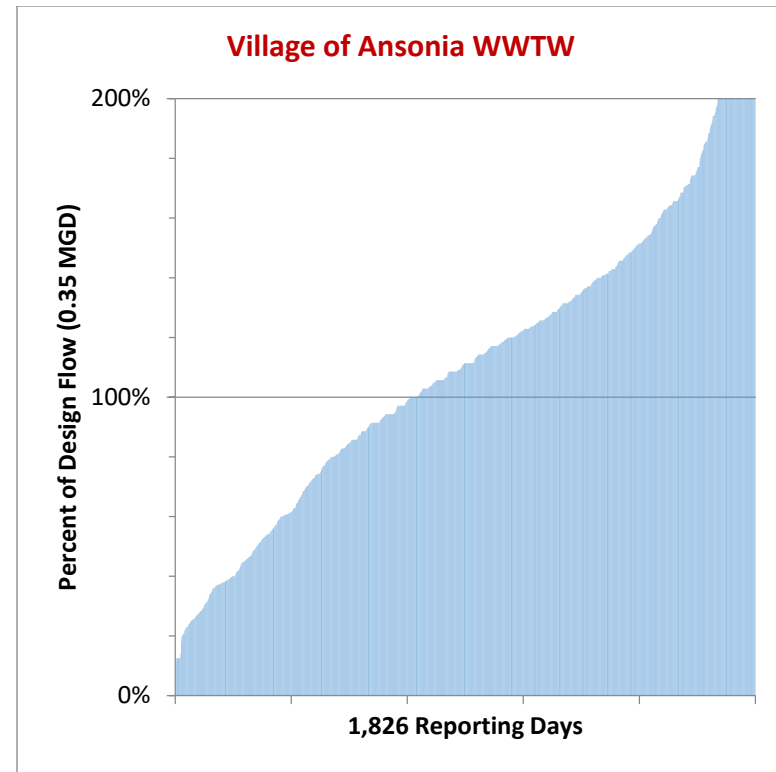
With a design flow of 0.06 MGD and a mean reported flow of 0.044 MGD (excluding outliers) the Village of Laura WWTP is typically experiencing flow rates at 73 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.03 and 0.055 MGD. Thirteen months from May 2017 through April 2022 exceeded 0.06 MGD on a monthly average. Since May of 2017 there have been 636 individual days (35% of days) during which reported flow exceeded 0.048 MGD (80% of capacity). There were 341 days since May 2017 during which the reported flow exceeded 0.06 MGD (100% of capacity) and of these 204 exceeded 0.072 MGD (120% of capacity). The facility reported 51 days with flow above 200% of capacity.



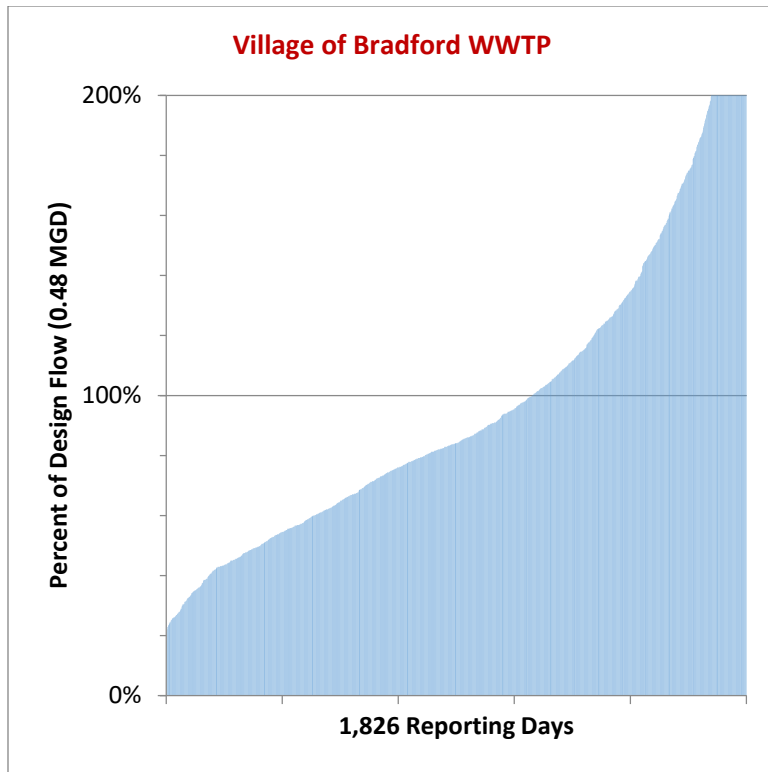
With a design flow of 0.75 MGD and a mean reported flow of 0.55 MGD (excluding outliers) the Village of Versailles WWTP is typically experiencing flow rates at 74 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.5 and 0.7 MGD. Fourteen months from May 2017 through April 2022 exceeded 0.75 MGD on a monthly average. Since May of 2017 there have been 605 individual days (33% of days) during which reported flow exceeded 0.6 MGD (80% of capacity). There were 310 days since May 2017 during which the reported flow exceeded 0.75 MGD (100% of capacity) and of these 185 exceeded 0.9 MGD (120% of capacity). The facility reported 52 days with flow above 200% of capacity.



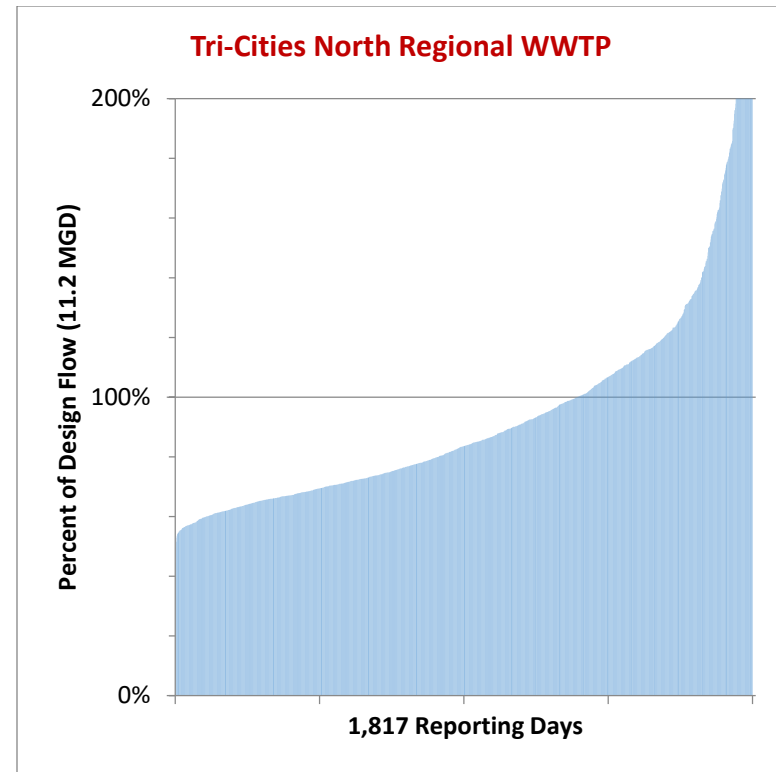
This facility serves the Villages of West Milton and Ludlow Falls. With a design flow of 1.2 MGD and a mean reported flow of 0.74 MGD (excluding outliers) the Village of West Milton WWTP is typically experiencing flow rates at 61 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.7 and 0.9 MGD. Ten months from May 2017 through April 2022 exceeded 1.2 MGD on a monthly average. Since May of 2017 there have been 483 individual days (26% of days) during which reported flow exceeded 0.96 MGD (80% of capacity). There were 274 days since May 2017 during which the reported flow exceeded 1.2 MGD (100% of capacity), and of these 184 days exceeded 1.44 MGD (120% of capacity). The facility reported 38 days with flows above 200% of design flow.



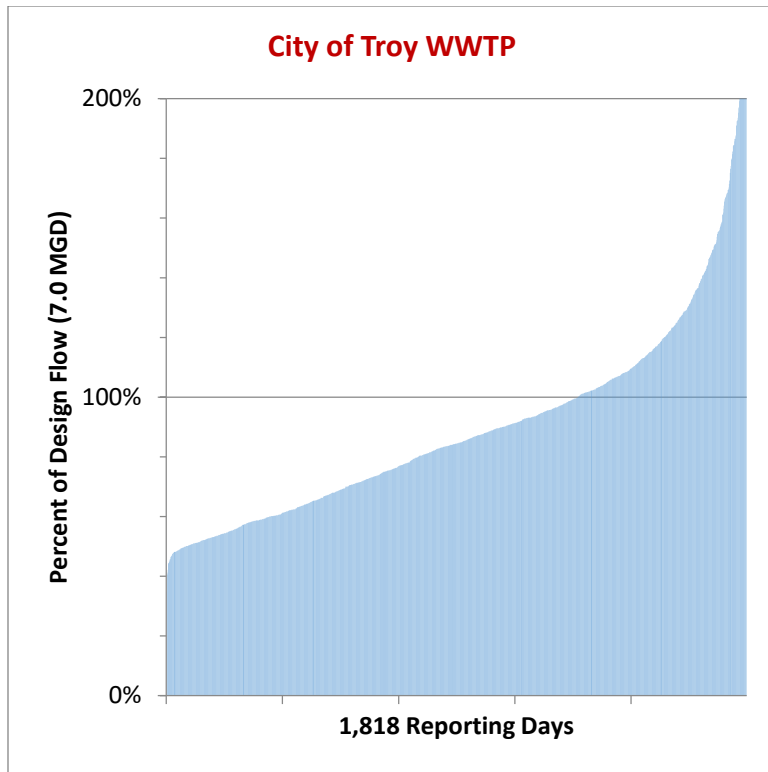
With a design flow of 0.35 MGD and a mean reported flow of 0.38 MGD (excluding outliers) the Village of Ansonia WWTP is typically experiencing flow rates at 108 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.38 and 0.43 MGD. Thirty-seven of sixty months from May 2017 through April 2022 exceeded 0.35 MGD on a monthly average. Since May of 2017 there have been 1,326 individual days (73% of days) during which reported flow exceeded 0.28 MGD (80% of capacity). There were 1,065 days since May 2017 during which the reported flow exceeded 0.35 MGD (100% of capacity) and of these 761 exceeded 0.42 MGD (120% of capacity). The facility reported 117 days with flow above 200% of capacity. The Ansonia facility also serves the Village of Rossburg.



With a design flow of 0.48 MGD and a mean reported flow of 0.432 MGD (excluding outliers) the Village of Bradford WWTP is typically experiencing flow rates at 90 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.3 and 0.6 MGD. Twenty-four of sixty months from May 2017 through April 2022 exceeded 0.48 MGD on a monthly average. Since May of 2017 there have been 1,012 individual days (55% of days) during which reported flow exceeded 0.384 MGD (80% of capacity). There were 674 days since May 2017 during which the reported flow exceeded 0.48 MGD (100% of capacity) and of these 481 exceeded 0.576 MGD (120% of capacity). The facility reported 112 days with flow above 200% of capacity.

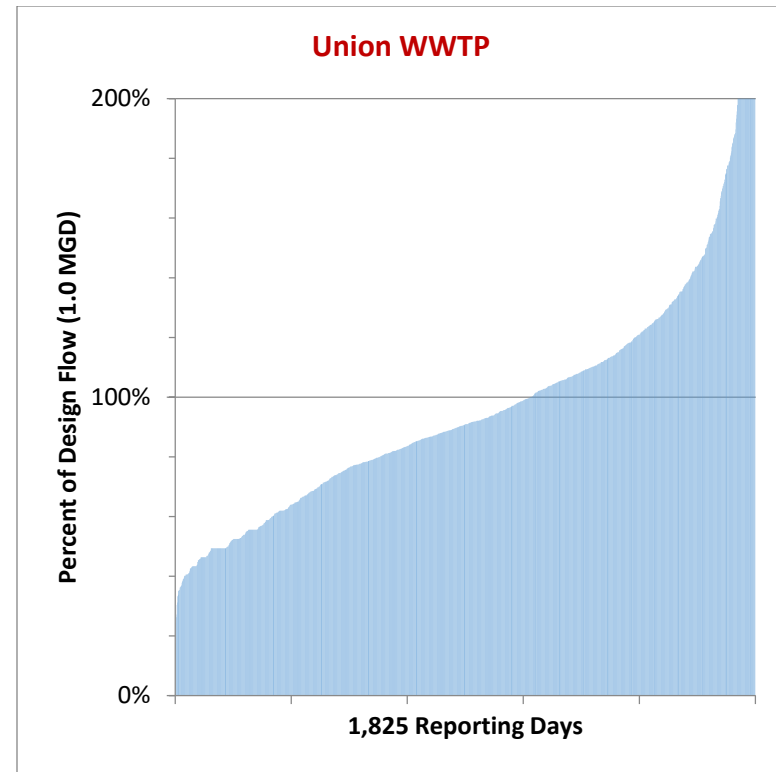


With a design flow of 11.2 MGD and a mean reported flow of 9.92 MGD (excluding outliers) the Tri-Cities North Regional WWTP is typically experiencing flow rates at 89 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 10.2 and 11.2 MGD. Twenty-seven of 60 months from May 2017 through April 2022 exceeded 11.2 MGD on a monthly average. Since May of 2017 there have been 990 individual days (54% of days) during which reported flow exceeded 8.96 MGD (80% of capacity). There have been 552 individual days since May 2017 during which the reported flow exceeded 11.2 MGD (100%) and 280 of these exceeded 13.44 MGD (120%). There were 54 days where reported flow exceeded 200% of design flow. Tri-Cities serves the cities of Huber Heights, Tipp City and Vandalia.



With a design flow of 7.0 MGD and a mean reported flow of 5.95 MGD (excluding outliers) the Troy WWTP is typically experiencing flow rates at 85 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 5.4 and 7.4 MGD. Twenty of sixty months from May 2017 through April 2022 exceeded 7.0 MGD on a monthly average. Since May of 2017 there have been 1,028 individual days (57% of days) during which reported flow exceeded 5.6 MGD (80% of capacity). There have been 528 individual days since May 2017 during which the reported flow exceeded 7.0 MGD (100%) and 259 of these exceeded 8.4 MGD (120%). The facility reported 23 days with flows in excess of 200% of design flow.

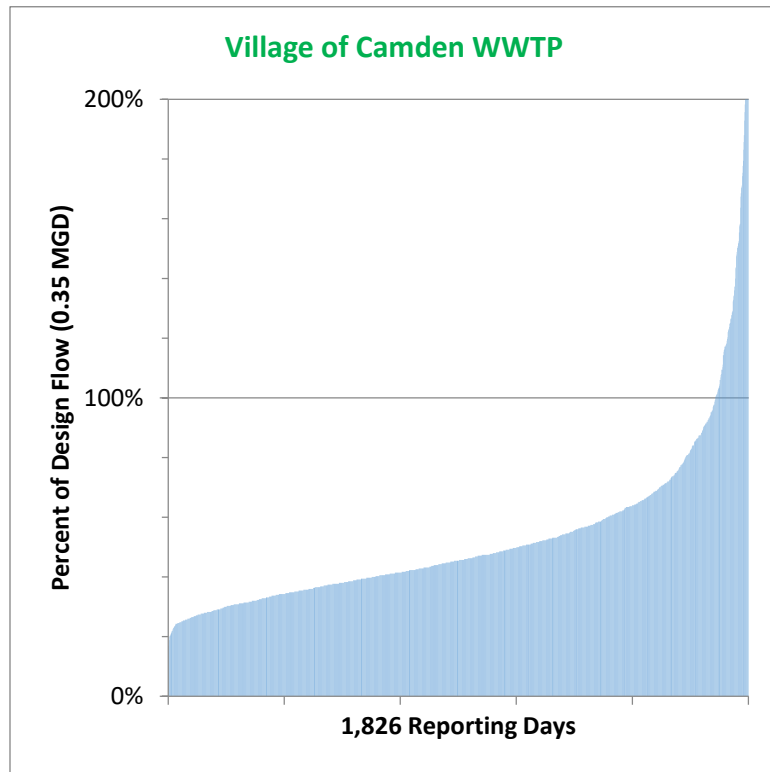
The city of Troy has an approved PTI to add a third aeration tank including selectors, blowers, air piping, diffusers, and replace four screw pumps that would expand the design flow of the WWTP to 9.0 MGD. Construction is expected to be completed in 2024.



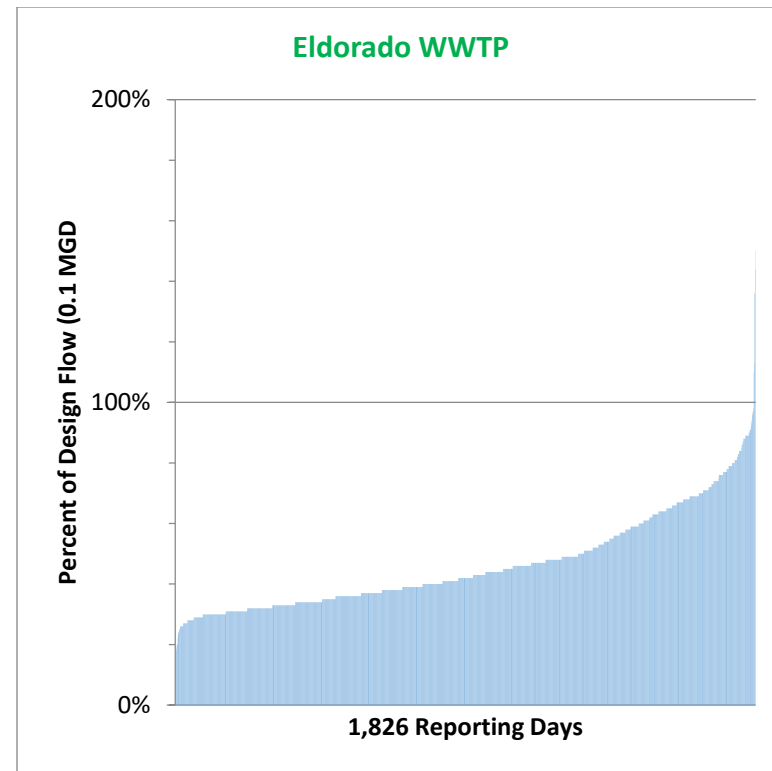
With a design flow of 1.0 MGD and a mean reported flow of 0.918 MGD (excluding outliers) the City of Union WWTP is typically experiencing flow rates at 92 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.84 and 1.05 MGD. Thirty-one of sixty months from May 2017 through April 2022 exceeded 1.0 MGD on a monthly average. Since May of 2017 there have been 1,181 individual days (65% of days) during which reported flow exceeded 0.80 MGD (80% of capacity). There have been 708 individual days since May 2017 during which the reported flow exceeded 1.0 MGD (100%) and 380 of these exceeded 1.2 MGD (120%). The facility reported 56 days above 200% of design flow.

The city received a PTI in 2018 for facility improvements which are estimated to increase design flow to 1.6 MGD. As of October 2021 these upgrades have been implemented. A rerate study and anti-degradation review will be required to incorporate an increased design flow into future facility permits.

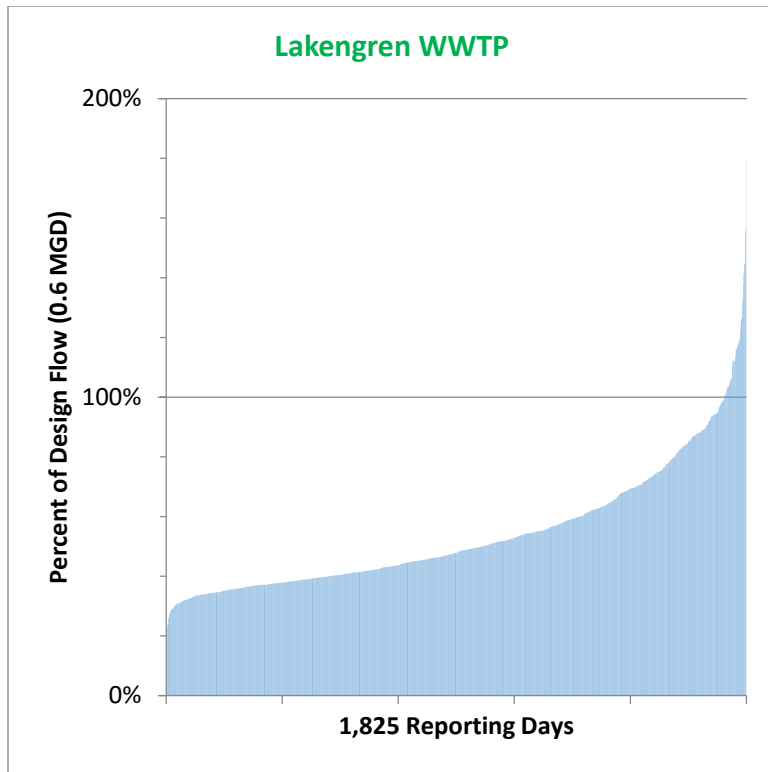
Lower Great Miami River Watershed (05080002)



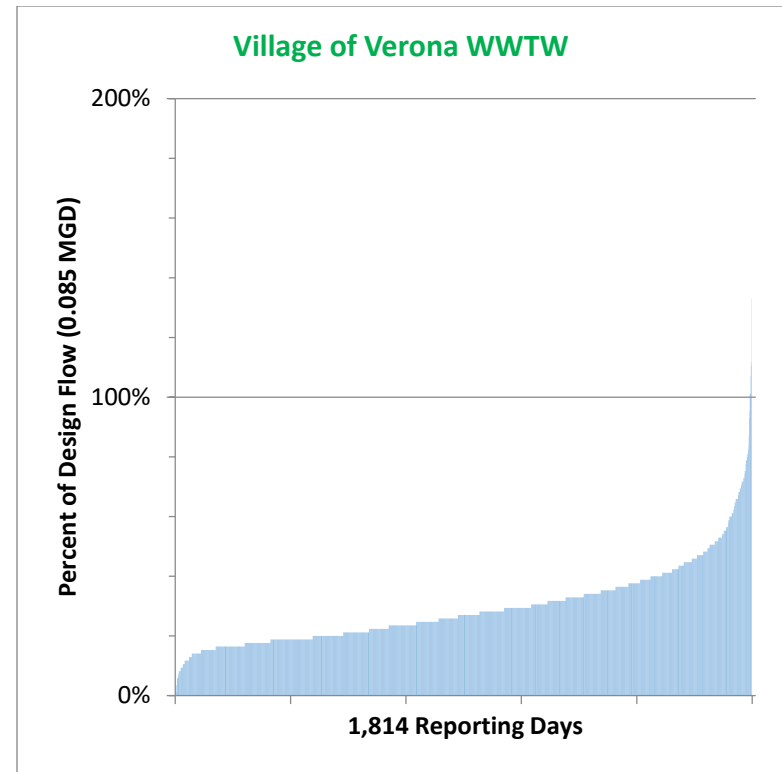
With a design flow of 0.35 MGD and a mean reported flow of 0.17 MGD (excluding outliers) the Village of Camden WWTP is typically experiencing flow rates at 48 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.15 and 0.2 MGD. Only one of sixty months from May 2017 through April 2022 exceeded 0.35 MGD on a monthly average. Since May of 2017 there have been 199 individual days (11% of days) during which reported flow exceeded 0.28 MGD (80% of capacity). There were 105 days since May 2017 during which the reported flow exceeded 0.35 MGD (100% of capacity) and of these 67 exceeded 0.42 MGD (120% of capacity). The facility reported 11 days with flow above 200% of capacity.



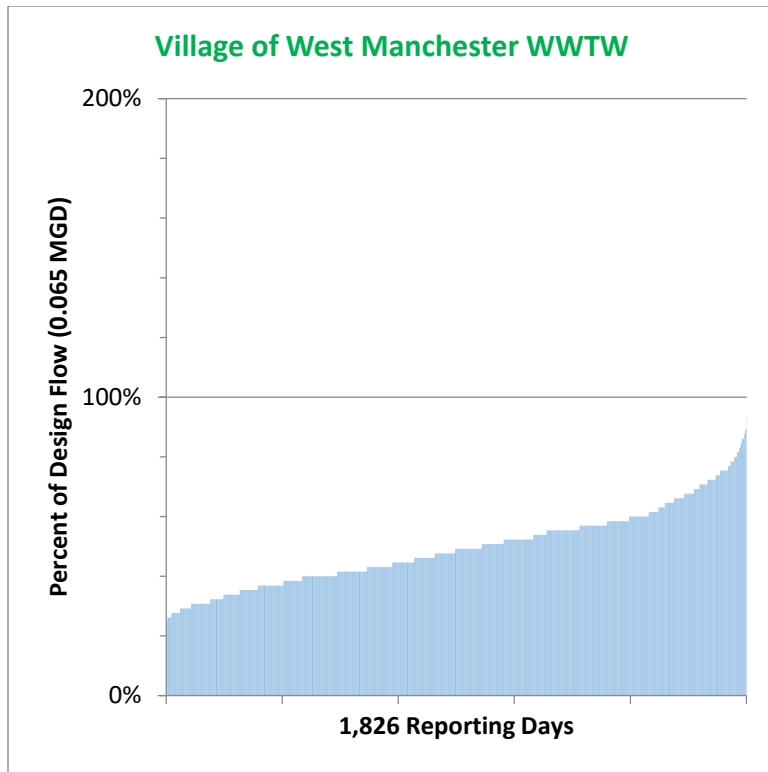
With a design flow of 0.1 MGD and average daily flow (excluding outliers) of 0.044 MGD the Eldorado WWTP is typically experiencing flow rates at 44 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.043 and 0.055 MGD. No month exceeded 0.08 MGD (May 2019) on a monthly average in the period. Since May of 2017 there have been 74 individual days (4% of days) during which reported flow exceeded 0.08 MGD (80% of capacity). There have been six individual days since May 2017 during which the reported flow exceeded 0.1 MGD (100%) and four of these exceeded 0.12 MGD (120%). All six days above 0.1 MGD have occurred since December 2021.



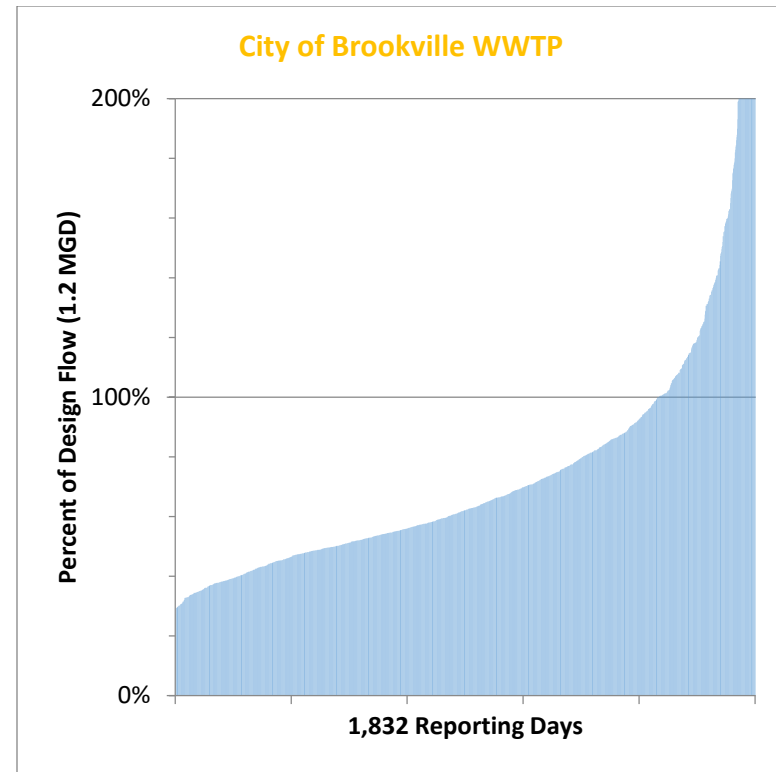
With a design flow of 0.6 MGD and a mean reported flow of 0.308 MGD (excluding high and low outliers) the Lakengren Water Authority WWTP is typically experiencing flow rates at 51 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.30 and 0.35 MGD. No months from May 2017 through April 2022 exceeded 0.6 MGD on a monthly average. Since May of 2017 there have been 225 individual days (12% of days) during which reported flow exceeded 0.48 MGD (80% of capacity). There were 70 days since May 2017 during which the reported flow exceeded 0.6 MGD (100% of capacity), and of these 20 days exceeded 0.72 MGD (120% of capacity).



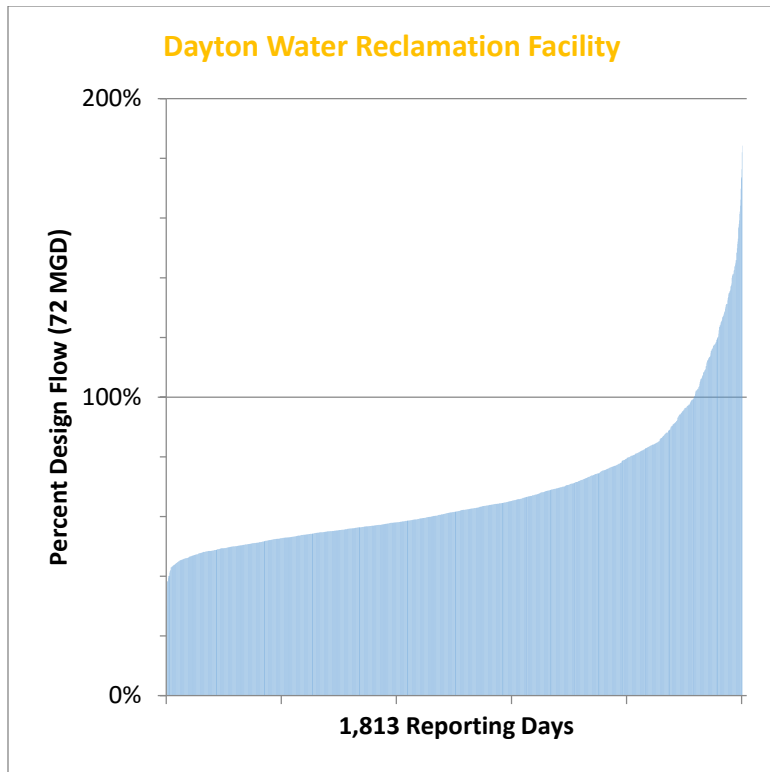
With a design flow of 0.085 MGD and a mean reported flow of 0.024 MGD (excluding high and low outliers) the Village of Verona WWTP is typically experiencing flow rates at 28 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.019 and 0.030 MGD. No months from May 2017 through April 2022 exceeded 0.085 MGD on a monthly average. Since May of 2017 there have been 14 individual days (1% of days) during which reported flow exceeded 0.068 MGD (80% of capacity). There were seven days since May 2017 during which the reported flow exceeded 0.085 MGD (100% of capacity) and of these one day exceeded 0.102 MGD (120% of capacity).



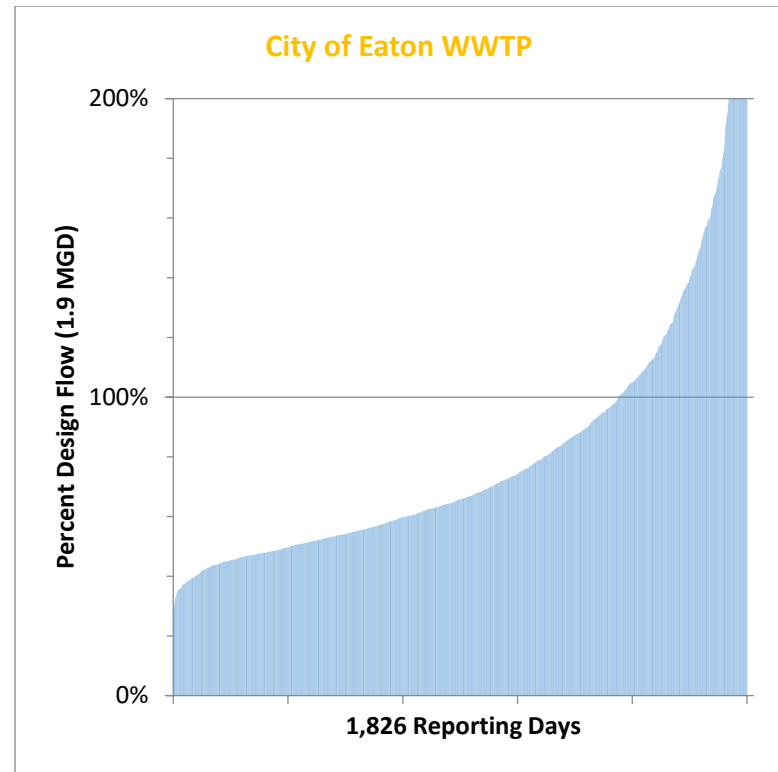
With a design flow of 0.065 MGD and a mean reported flow of 0.0314 MGD (excluding outliers) the Village of West Manchester WWTW is typically experiencing flow rates at 48 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.030 and 0.037 MGD. No months from May 2017 through April 2022 exceeded 0.065 MGD on a monthly average. Since May of 2017 there have been 31 individual days (2% of days) during which reported flow exceeded 0.052 MGD (80% of capacity). There were no days since May 2017 during which the reported flow exceeded 0.065 MGD (100% of capacity).



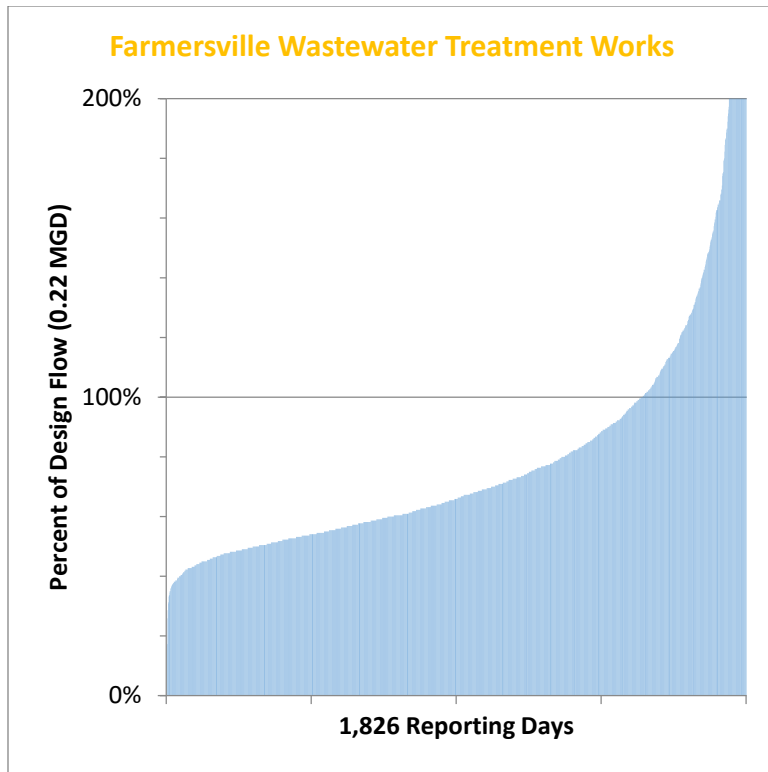
With a design flow of 1.2 MGD and a mean reported flow of 0.815 MGD (excluding outliers) the Brookville WWTP is typically experiencing flow rates at 68 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.7 and 1.0 MGD. Thirteen months from May 2017 through May 2022 exceeded 1.2 MGD on a monthly average. Since May of 2017 there have been 545 individual days (30% of days) during which reported flow exceeded 0.96 MGD (80% of capacity). There have been 305 individual days since May 2017 during which the reported flow exceeded 1.2 MGD (100%) and 183 of these exceeded 1.44 MGD (120%). The facility reported 54 days with flows above 200% of design flow.



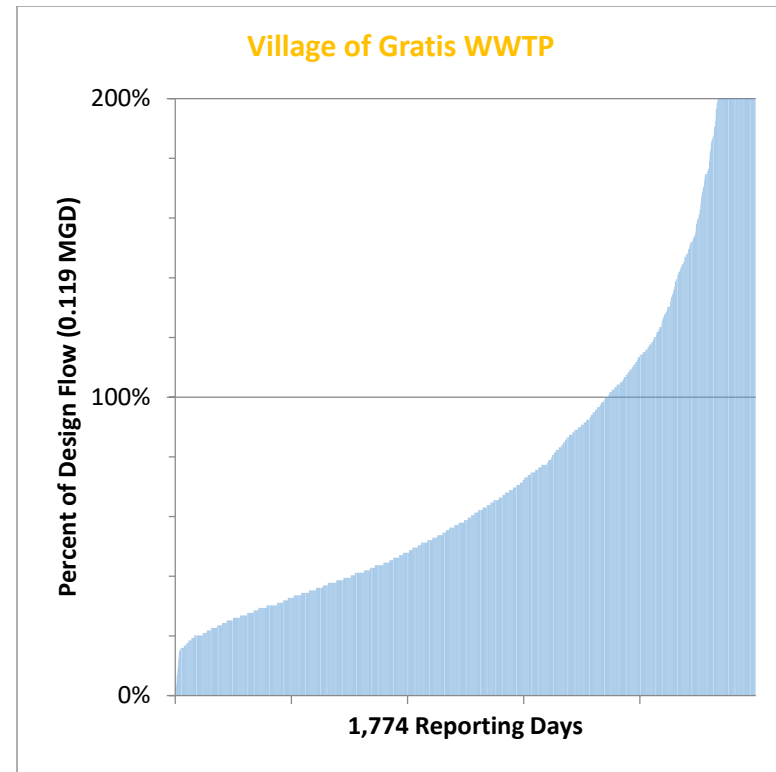
With a design flow of 72 MGD and a mean reported flow of 46 MGD (excluding outliers) the Dayton WRF is typically experiencing flow rates at 64 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 47.9 and 52.5 MGD. Only one month from May 2017 through April 2022 exceeded 72 MGD on a monthly average (February 2019). Since May of 2017 there have been 356 individual days (20% of days) during which reported flow exceeded 57.6 MGD (80% of capacity). There have been 152 individual days since May 2017 during which the reported flow exceeded 72 MGD (100%) and 79 of these exceeded 86.4 MGD (120%).



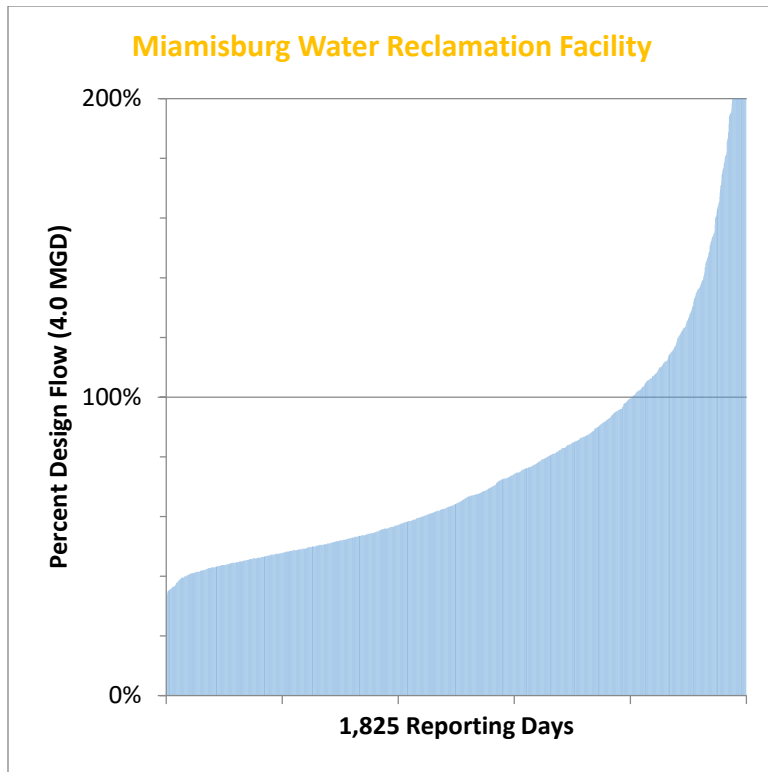
With a design flow of 1.9 MGD and a mean reported flow of 1.39 MGD (excluding outliers) the City of Eaton WWTP is typically experiencing flow rates at 73 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 1.35 and 1.7 MGD. Sixteen months from May 2017 through April 2022 exceeded 1.9 MGD on a monthly average. Since May of 2017 there have been 648 individual days (35% of days) during which reported flow exceeded 1.52 MGD (80% of capacity). There were 411 days since May 2017 during which the reported flow exceeded 1.9 MGD (100% of capacity), and of these 268 days exceeded 2.28 MGD (120% of capacity). The facility reported 60 days with flows above 200 percent of Design Flow.



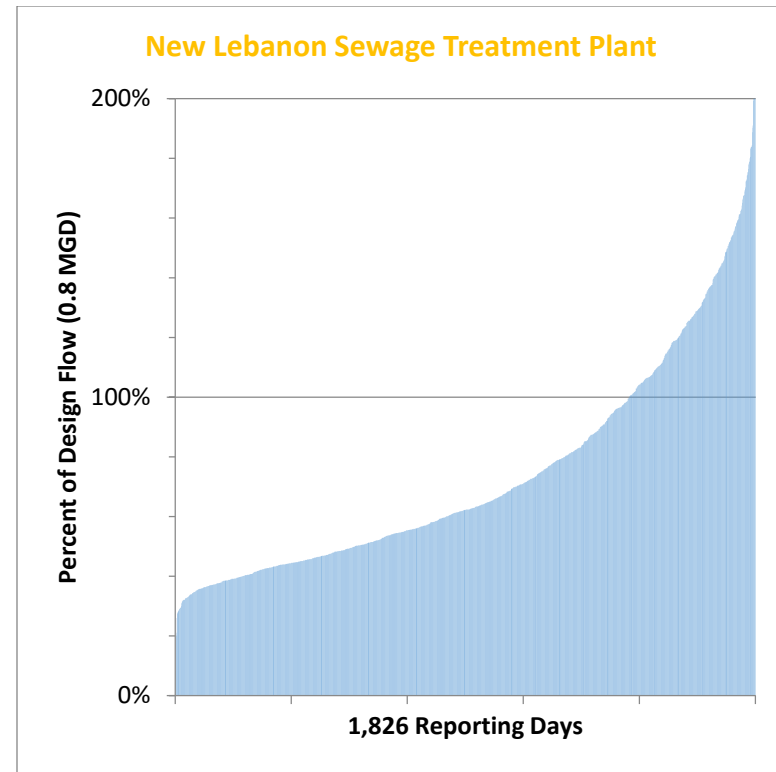
With a design flow of 0.22 MGD and a mean reported flow of 0.16 MGD (excluding outliers) the Farmersville Wastewater Treatment Works is typically experiencing flow rates at 73 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.16 and 0.18 MGD. Thirteen months from May 2017 through April 2022 exceeded 0.22 MGD on a monthly average. Since May of 2017 there have been 572 individual days (31% of days) during which reported flow exceeded 0.176 MGD (80% of capacity). There have been 327 individual days since May 2017 during which the reported flow exceeded 0.22 MGD (100%) and 210 of these exceeded 0.264 MGD (120%). There were 56 days with reported flow above 200% of design flow.



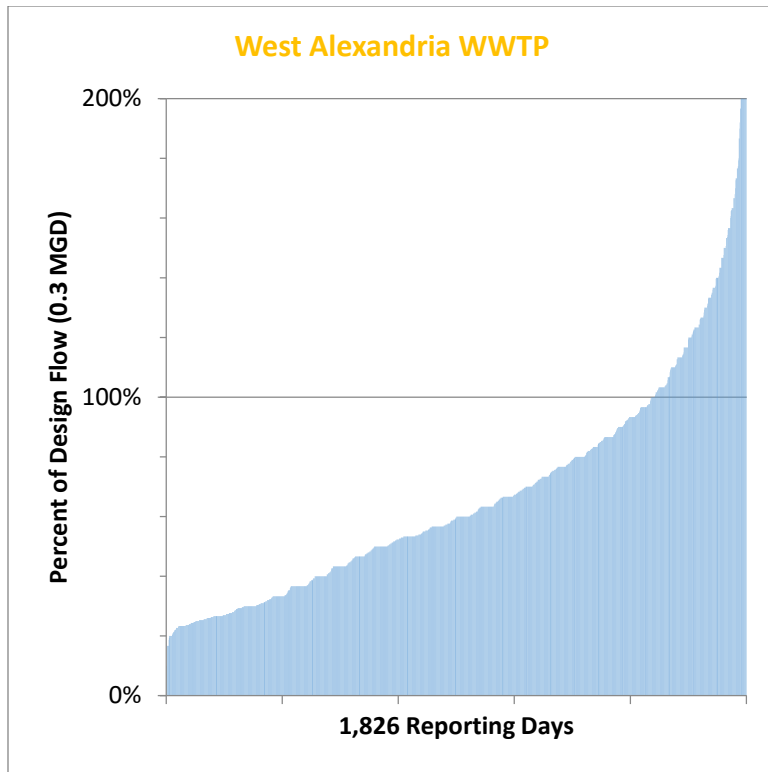
With a design flow of 0.119 MGD and a mean reported flow of 0.083 MGD (excluding outliers) the Village of Gratis WWTP is typically experiencing flow rates at 70 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.07 and 0.1 MGD. Eighteen months from May 2017 through April 2022 exceeded 0.119 MGD on a monthly average. Since May of 2017 there have been 622 individual days (35% of days) during which reported flow exceeded 0.095 MGD (80% of capacity). There were 450 days since May 2017 during which the reported flow exceeded 0.119 MGD (100% of capacity) and of these 311 exceeded 0.143 MGD (120% of capacity). The facility reported 116 days with flow above 200% of capacity.



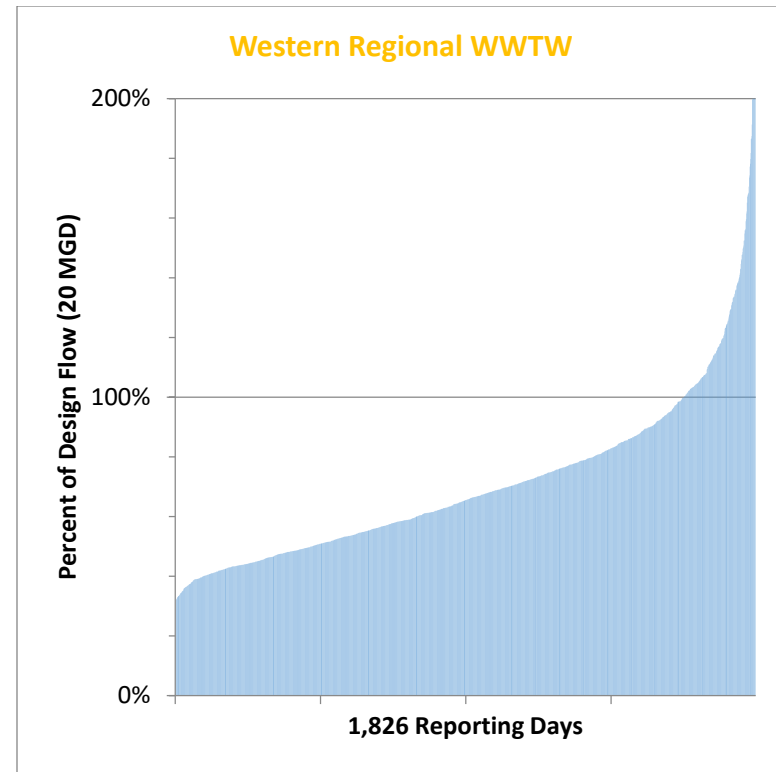
With a design flow of 4.0 MGD and a mean reported flow of 2.83 MGD (excluding outliers) the Miamisburg WRF is typically experiencing flow rates at 71 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 2.5 and 3.4 MGD. Fourteen months from May 2017 through April 2022 exceeded 4.0 MGD on a monthly average. Since May of 2017 there have been 624 individual days (34% of days) during which reported flow exceeded 3.2 MGD (80% of capacity). There have been 358 individual days since May 2017 during which the reported flow exceeded 4.0 MGD (100%) and 214 of these exceeded 4.8 MGD (120%). The facility reported 45 days with flows in excess of 200% of design flow.



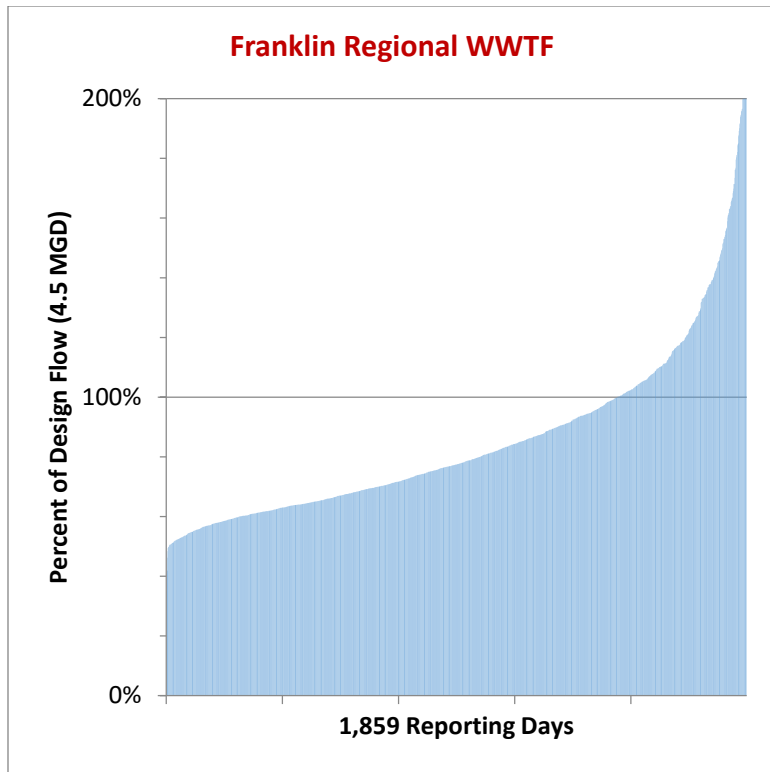
With a design flow of 0.8 MGD and a mean reported flow of 0.55 MGD (excluding outliers) the New Lebanon STP is typically experiencing flow rates at 69 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.5 and 0.67 MGD. Twelve of sixty months from May 2017 through April 2022 exceeded 0.8 MGD on a monthly average. Since May of 2017 there have been 600 individual days (33% of days) during which reported flow exceeded 0.64 MGD (80% of capacity). There were 398 days since May 2017 during which the reported flow exceeded 0.8 MGD (100% of capacity) and of these 243 exceeded 0.96 MGD (120% of capacity). The facility reported seven days with flow above 200% of capacity.



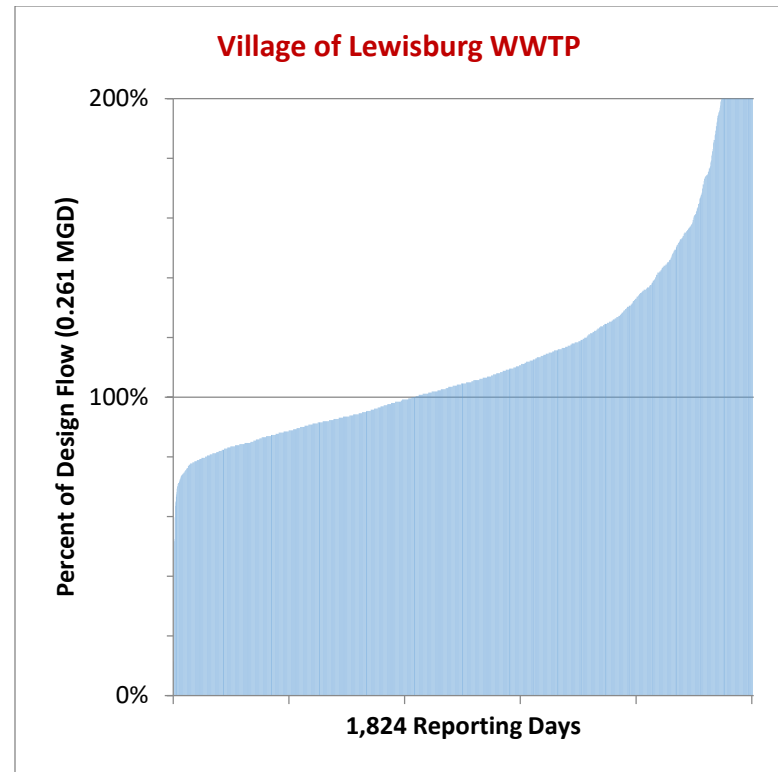
With a design flow of 0.3 MGD and a mean reported flow of 0.19 MGD (excluding outliers) the Village of West Alexandria WWTP is typically experiencing flow rates at 63 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.15 and 0.24 MGD. Ten months from May 2017 through April 2022 exceeded 0.3 MGD on a monthly average. Since May of 2017 there have been 510 individual days (28% of days) during which reported flow exceeded 0.24 MGD (80% of capacity). There were 289 days since May 2017 during which the reported flow exceeded 0.3 MGD (100% of capacity) and of these 174 exceeded 0.36 MGD (120% of capacity). The facility reported 18 days with flow above 200% of capacity.



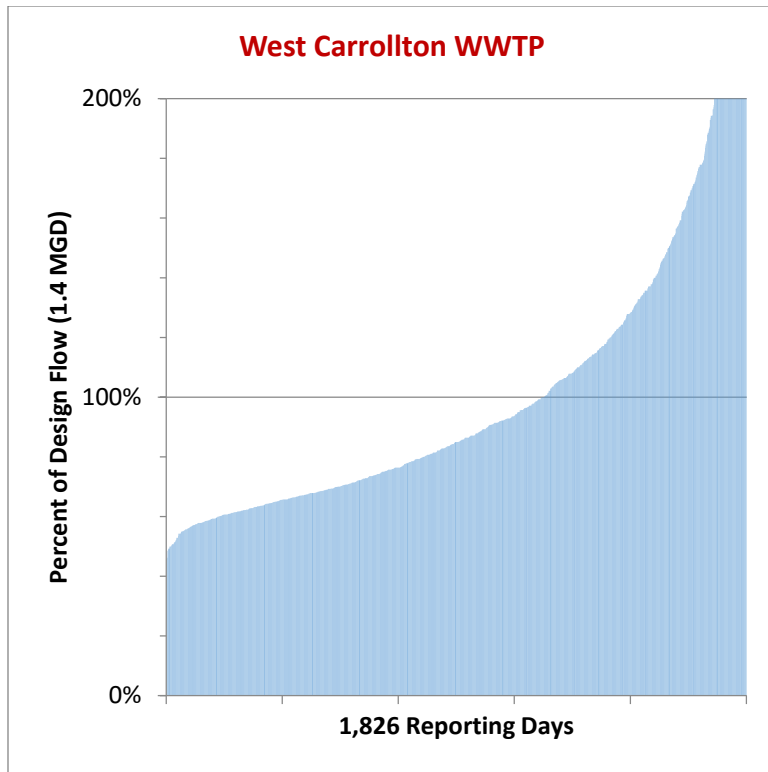
With a design flow of 20 MGD and a mean reported flow of 13.39 MGD (excluding outliers) the Western Regional Wastewater Treatment Works is typically experiencing flow rates at 67 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 11.8 and 16.0 MGD. Six months from May 2017 through April 2022 exceeded 20 MGD on a monthly average. Since May of 2017 there have been 510 individual days (28% of days) during which reported flow exceeded 16 MGD (80% of capacity). There have been 225 individual days since May 2017 during which the reported flow exceeded 20 MGD (100%) and 102 of these exceeded 24 MGD (120%). The facility 10 days with flows above 200% of design flow.



With a design flow of 4.5 MGD and a mean reported flow of 3.63 MGD (excluding outliers) the Franklin Regional WWTF is typically experiencing flow rates at 81 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 3.5 and 4.2 MGD. Fifteen months from May 2017 through June 2022 exceeded 4.5 MGD on a monthly average. Since May of 2017 there have been 854 individual days (46% of days) during which reported flow exceeded 3.6 MGD (80% of capacity). There were 414 days since May 2017 during which the reported flow exceeded 4.5 MGD (100% of capacity), and of these 196 days exceeded 5.4 MGD (120% of capacity). The facility reported 13 days above 200% of capacity.

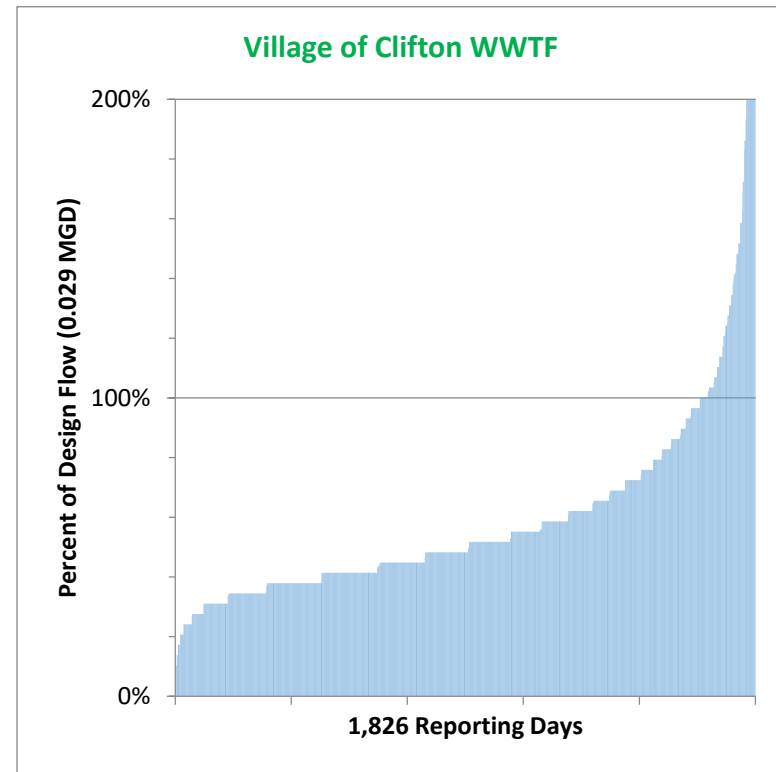


With a design flow of 0.261 MGD and a mean reported flow of 0.286 MGD (excluding high and low outliers) the Village of Lewisburg WWTP is typically experiencing flow rates at 109 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.28 and 0.34 MGD. Forty-three of sixty months from May 2017 through April 2022 exceeded 0.261 MGD on a monthly average. Since May of 2017 there have been 1,718 individual days (94% of days) during which reported flow exceeded 0.209 MGD (80% of capacity). There were 1,061 days since May 2017 during which the reported flow exceeded 0.261 MGD (100% of capacity) and of these 523 exceeded 0.313 MGD (120% of capacity). The facility reported 99 days with flow above 200% of capacity.

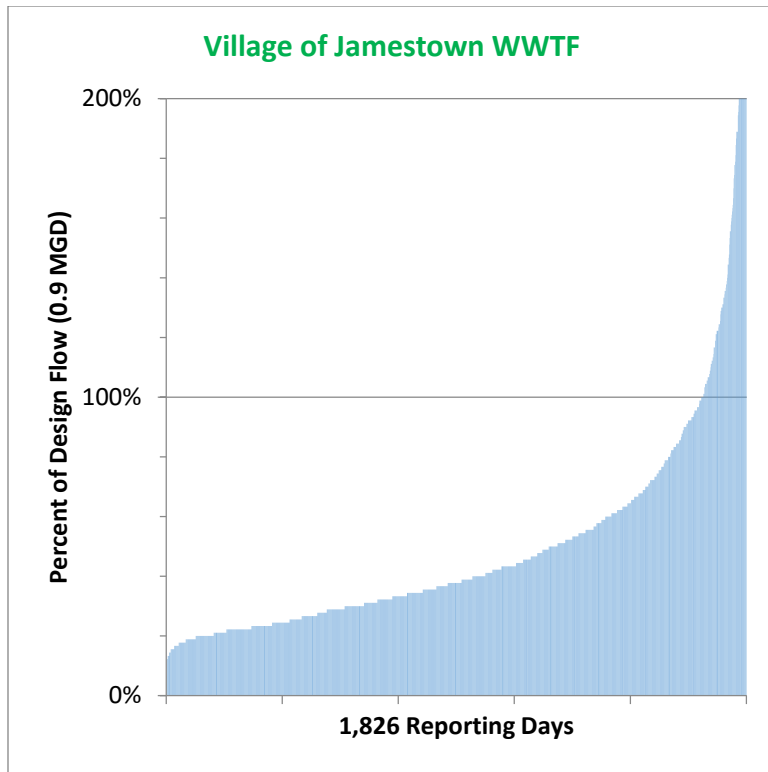


With a design flow of 1.4 MGD and a mean reported flow of 1.3 MGD (excluding outliers) the West Carrollton WWTP is typically experiencing flow rates at 93 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 1.2 and 1.6 MGD. Twenty-six of sixty months from May 2017 through April 2022 exceeded 1.4 MGD on a monthly average. Since May of 2017 there have been 1,013 individual days (55% of days) during which reported flow exceeded 1.12 MGD (80% of capacity). There have been 638 individual days since May 2017 during which the reported flow exceeded 1.4 MGD (100%) and 428 of these exceeded 1.68 MGD (120%). The facility reported 102 days above 200% of capacity.

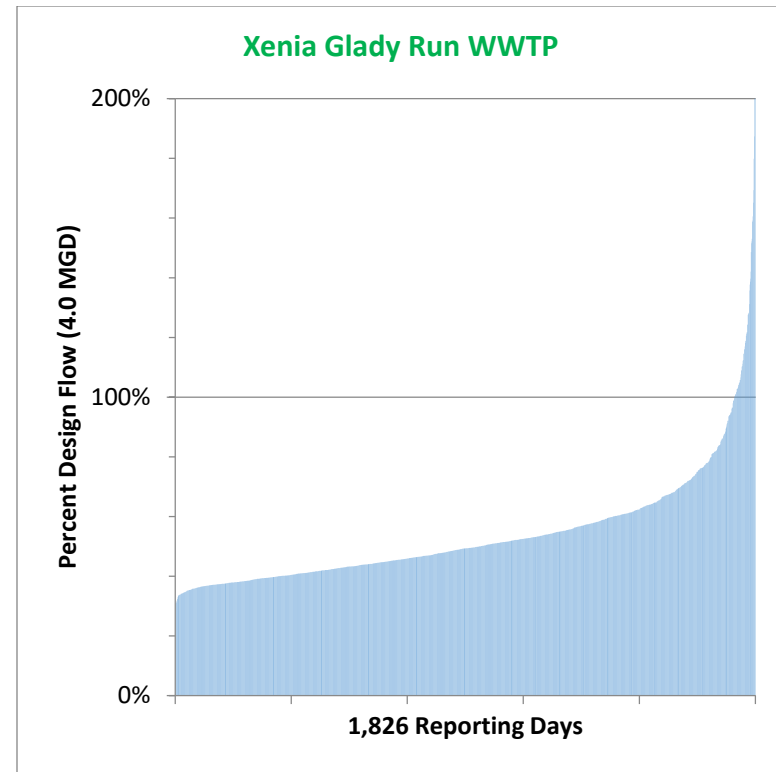
Upper Little Miami River Watershed (05090202)



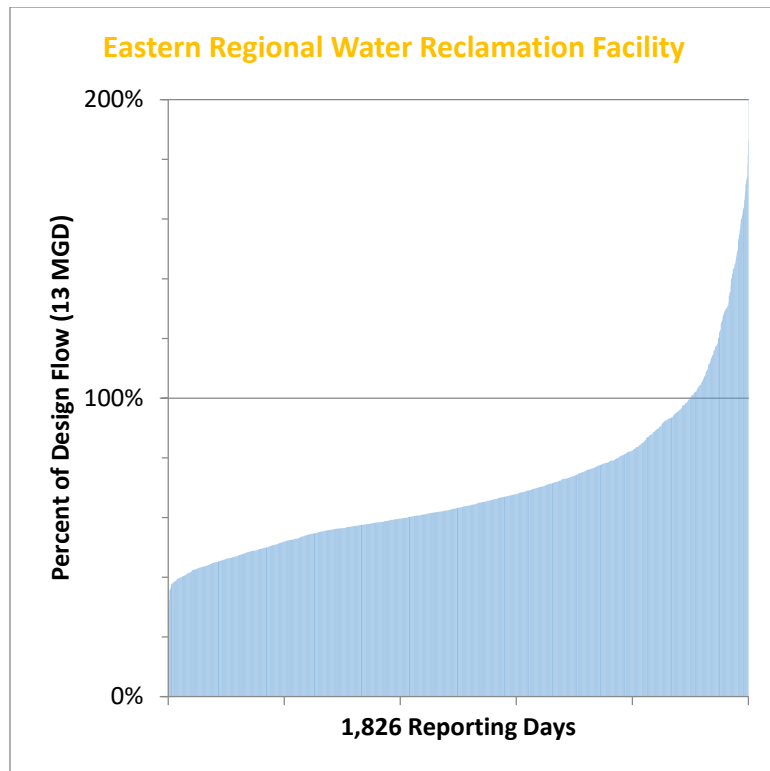
With a design flow of 0.029 MGD and a mean reported flow of 0.017 MGD (excluding outliers) the Village of Clifton WWTF is typically experiencing flow rates at 57 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.015 and 0.019 MGD. Four of sixty months from May 2017 through April 2022 exceeded 0.029 MGD on a monthly average. Since May of 2017 there have been 296 individual days (16% of days) during which reported flow exceeded 0.0232 MGD (80% of capacity). There were 151 days since May 2017 during which the reported flow exceeded 0.029 MGD (100% of capacity) and of these 102 exceeded 0.0348 MGD (120% of capacity). The facility reported 28 days with flow above 200% of capacity.



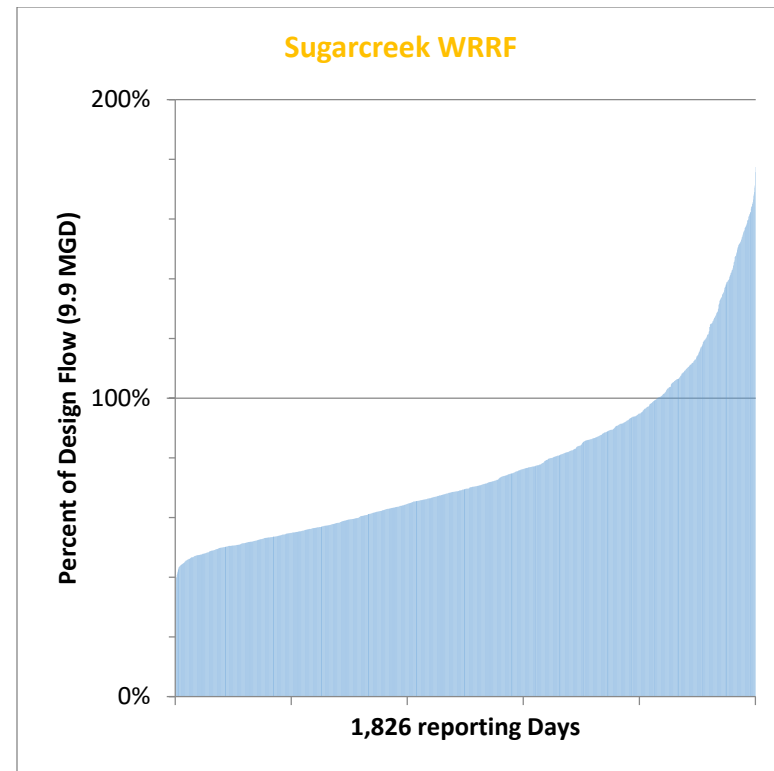
With a design flow of 0.9 MGD and a mean reported flow of 0.418 MGD (excluding outliers) the Village of Jamestown WWTP is typically experiencing flow rates at 46 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.39 and 0.51 MGD. Three of sixty months from May 2017 through April 2022 exceeded 0.9 MGD on a monthly average. Since May of 2017 there have been 240 individual days (13% of days) during which reported flow exceeded 0.72 MGD (80% of capacity). There were 136 days since May 2017 during which the reported flow exceeded 0.9 MGD (100% of capacity) and of these 98 exceeded 1.08 MGD (120% of capacity). The facility reported 25 days with flow above 200% of capacity.



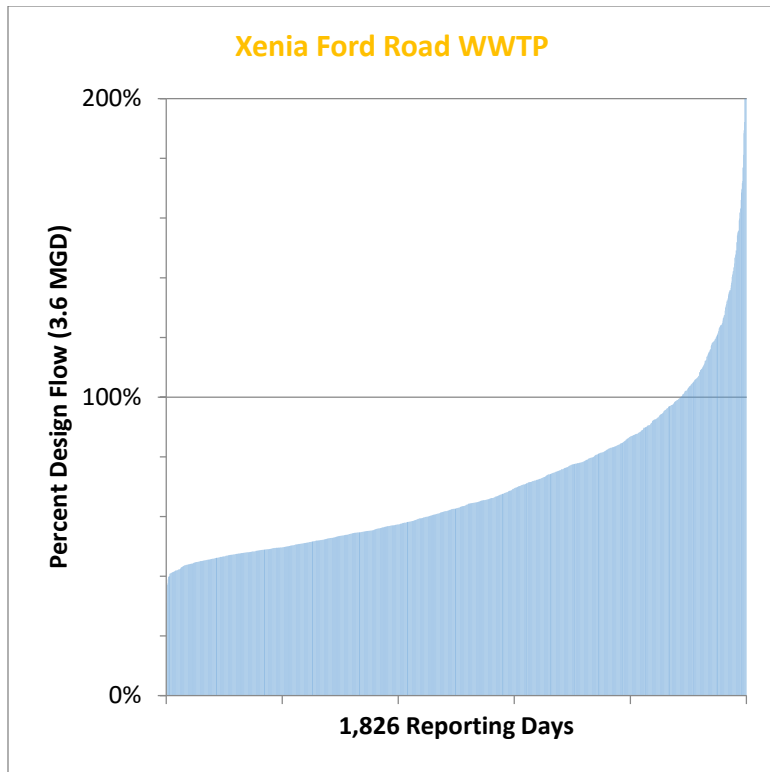
With a design flow of 4.0 MGD and a mean reported flow of 2.04 MGD (excluding outliers) the Xenia Glady Run WWTP is typically experiencing flow rates at 51 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 1.9 and 2.4 MGD. Only one month from May 2017 through April 2022 exceeded 4.0 MGD on a monthly average. Since May of 2017 there have been 139 individual days (8% of days) during which reported flow exceeded 3.2 MGD (80% of capacity). There have been 67 individual days since May 2017 during which the reported flow exceeded 4.0 MGD (100%) and 31 of these exceeded 4.8 MGD (120%). The facility reported four days with flows above 200% of design flow.



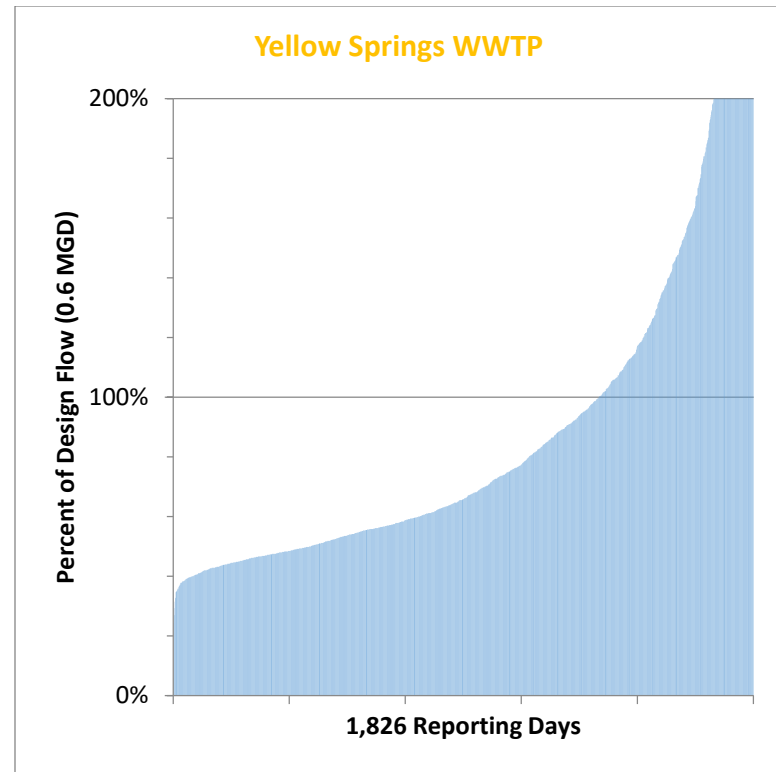
With a design flow of 13 MGD and a mean reported flow of 8.55 MGD (excluding outliers) the Eastern Regional Water Reclamation Facility is typically experiencing flow rates at 66 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 8.6 and 9.3 MGD. Five months from May 2017 through April 2022 exceeded 13 MGD on a monthly average. Since May of 2017 there have been 410 individual days (22% of days) during which reported flow exceeded 10.4 MGD (80% of capacity). There have been 184 individual days since May 2017 during which the reported flow exceeded 13 MGD (100%) and 96 of these exceeded 15.6 MGD (120%). The facility reported one day with flows above 200% during these 60 months.



With a design flow of 9.9 MGD and a mean reported flow of 7.16 MGD (excluding outliers) the Sugar creek WRRF is typically experiencing flow rates at 72 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 7.2 and 8.0 MGD. Eight months from May 2017 through April 2022 exceeded 9.9 MGD on a monthly average. Since May of 2017 there have been 639 individual days (35% of days) during which reported flow exceeded 7.92 MGD (80% of capacity). There have been 310 individual days since May 2017 during which the reported flow exceeded 9.9 MGD (100%) and 156 of these exceeded 11.88 MGD (120%). The facility experiences consistently high flows in February and March.

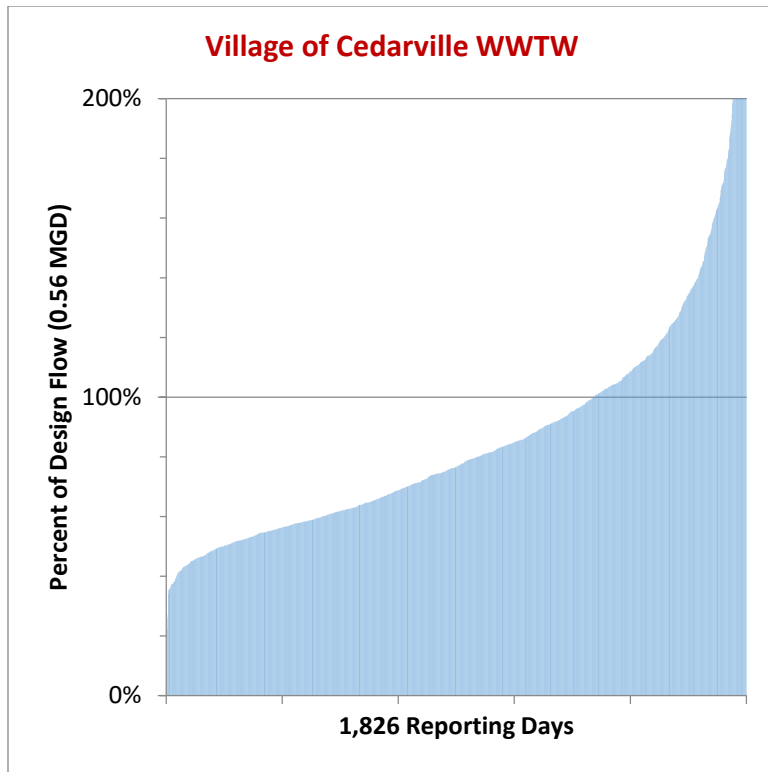


With a design flow of 3.6 MGD and a mean reported flow of 2.39 MGD (excluding outliers) the Xenia Ford Road WWTP is typically experiencing flow rates at 66.5 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 2.2 and 2.9 MGD. Seven months from May 2017 through April 2022 exceeded 3.6 MGD on a monthly average, five of which were from January to May in 2019. Since May of 2017 there have been 482 individual days (26% of days) during which reported flow exceeded 2.88 MGD (80% of capacity). There have been 208 individual days since May 2017 during which the reported flow exceeded 3.6 MGD (100%) and 97 of these exceeded 4.32 MGD (120%). The facility reported seven days with flow above 200% of design flow.

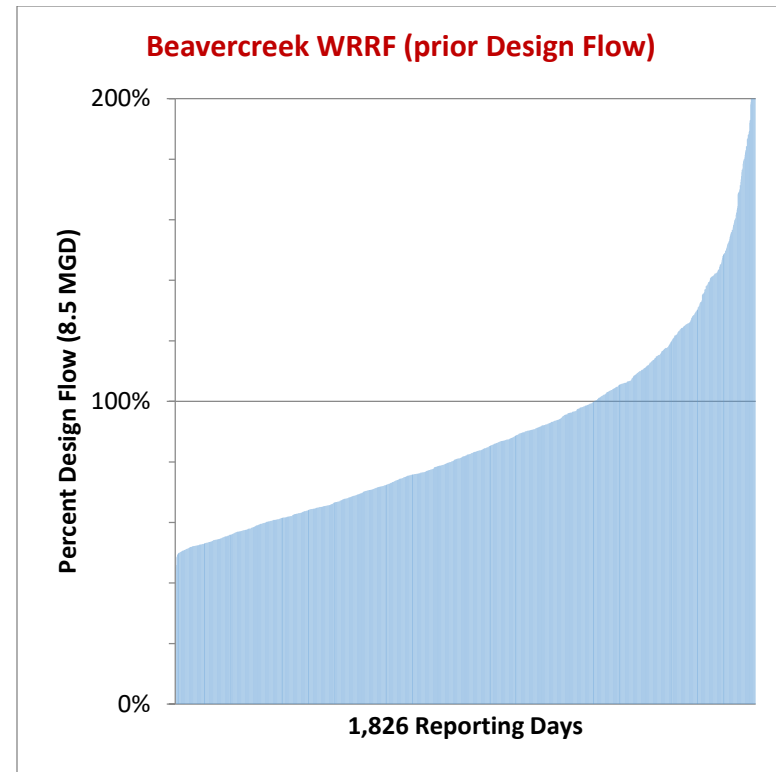


With a design flow of 0.6 MGD and a mean reported flow of 0.48 MGD (excluding outliers) the Village of Yellow Springs WWTP is typically experiencing flow rates at 79 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.4 and 0.7 MGD. Nineteen of sixty months from May 2017 through April 2022 exceeded 0.6 MGD on a monthly average. Since May of 2017 there have been 707 individual days (39% of days) during which reported flow exceeded 0.48 MGD (80% of capacity). There were 487 days since May 2017 during which the reported flow exceeded 0.6 MGD (100% of capacity), and of these 347 days exceeded 0.72 MGD (120% of capacity). The facility reported 126 days with flows above 200% of design flow.

Please see the case study in Section 4 about a Yellow Springs project to reduce flow rates into the Yellow Springs WWTP.



With a design flow of 0.56 MGD and a mean reported flow of 0.45 MGD (excluding outliers) the Village of Cedarville WWTP is typically experiencing flow rates at 81 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.44 and 0.53 MGD. Nineteen months from May 2017 through April 2022 exceeded 0.56 MGD on a monthly average. Since May of 2017 there have been 845 individual days (46% of days) during which reported flow exceeded 0.448 MGD (80% of capacity). There were 482 days since May 2017 during which the reported flow exceeded 0.56 MGD (100% of capacity) and of these 260 exceeded 0.672 MGD (120% of capacity). The facility reported 44 days with flow above 200% of capacity over these 60 months.



With a design flow of 8.5 MGD and a mean reported flow of 7.18 MGD (excluding outliers) the Beavercreek WRRF is typically experiencing flow rates at 84 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 6.7 and 7.9 MGD. Twenty months from May 2017 through April 2022 exceeded 8.5 MGD on a monthly average. Since May of 2017 there have been 958 individual days (52% of days) during which reported flow exceeded 6.8 MGD (80% of capacity). There have been 508 individual days since May 2017 during which the reported flow exceeded 8.5 MGD (100%) and 265 of these exceeded 10.2 MGD (120%). The facility reported 13 days with flows above 200% of design flow over these 60 months.

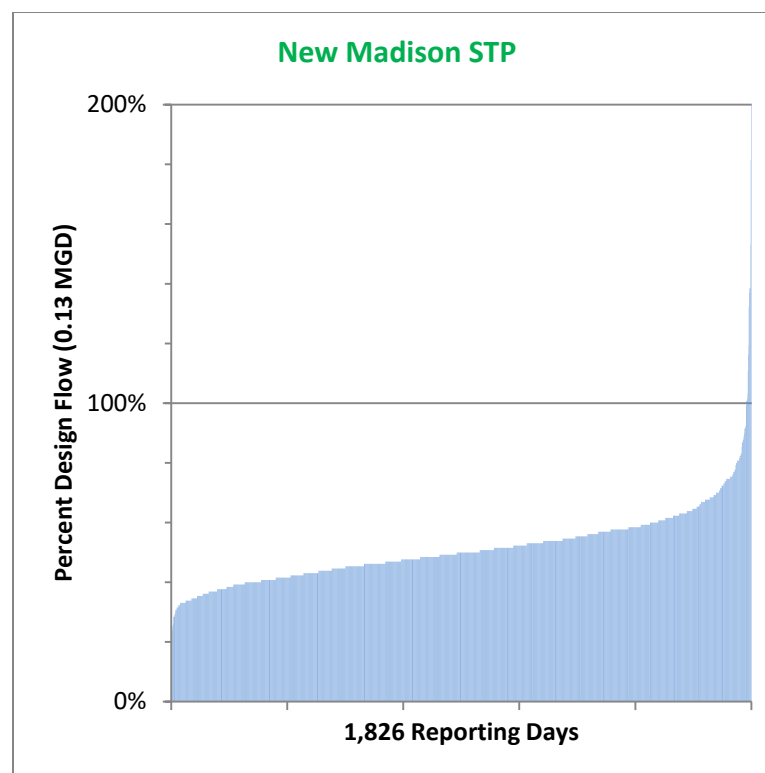
Please see the case study in Section 4 about rerating the design flow of this facility to 10.6 MGD.

East Fork Whitewater River (05080003)

The Whitewater River watershed is predominantly within the state of Indiana, but three facility planning areas in the MVRPC region are found in the Ohio portion of this watershed: New Madison, New Paris, and Palestine-Hollansburg.

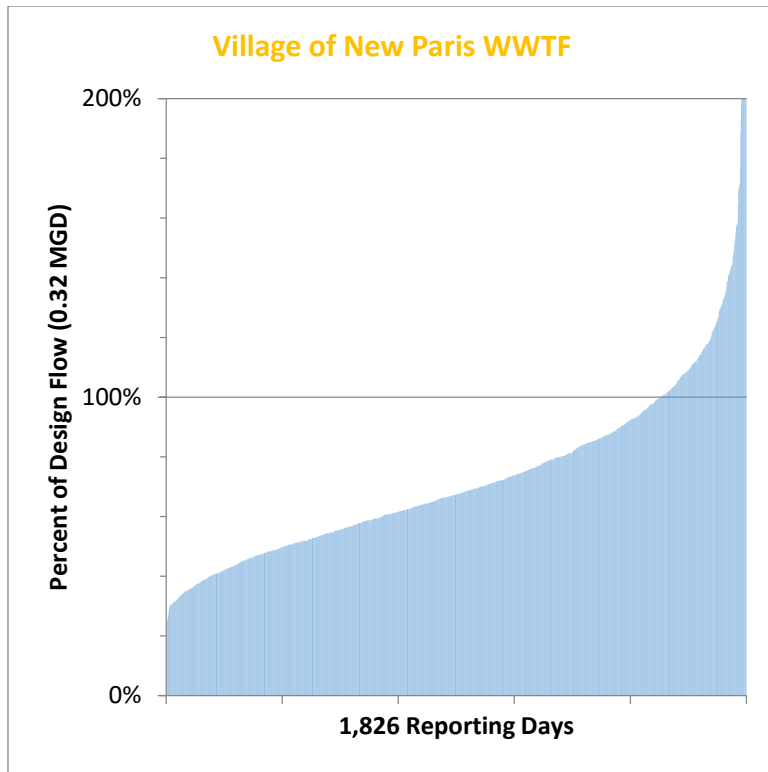
Palestine-Hollansburg (No data)

The villages of Palestine and Hollansburg in Darke County have formed the Palestine-Hollansburg Joint Sewer District (PHJSD) for the purpose of serving those two villages plus an unincorporated area known as Glen Karn with sanitary sewer. As of summer 2022 the collection system and treatment facility are not yet on line. It is anticipated that the facility will begin to accept flows in early 2024.



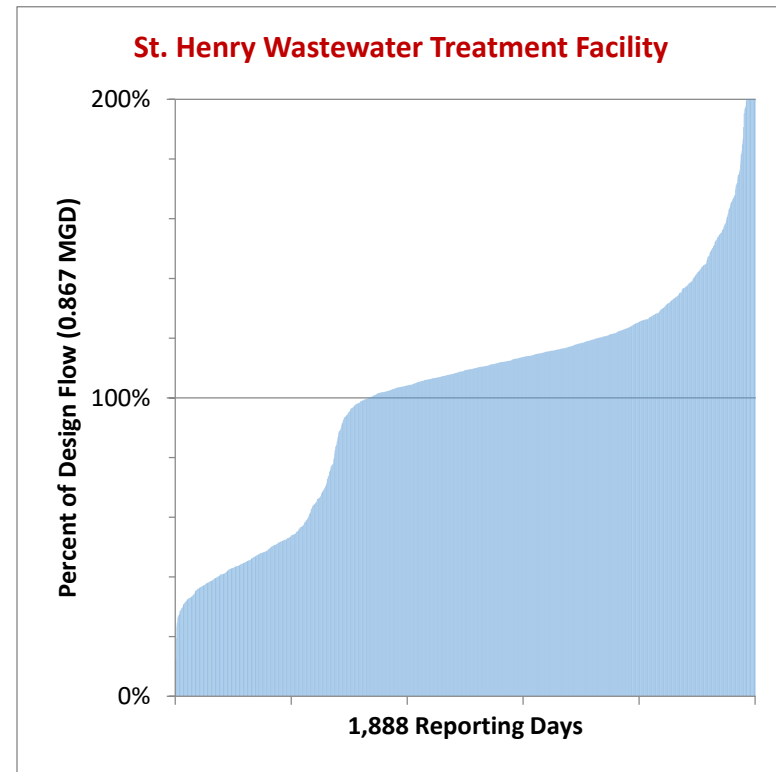
With a design flow of 0.13 MGD and a mean reported flow of 0.066 MGD (excluding outliers) the New Madison STP is typically experiencing flow rates at 51 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.06 and 0.077 MGD. No month exceeded 0.101 MGD (April 2018) on a monthly average in the period. Since May of 2017 there have been 49 individual days (3% of days) during which reported flow exceeded 0.104 MGD (80% of capacity). There have been 17 individual days since May 2017 during which the reported flow exceeded 0.13 MGD (100%) and nine of these exceeded 0.156 MGD (120%). The facility reported two days with flow above 200% of capacity over these 60 months.

The New Madison STP will also treat wastewater flows from the Village of Wayne Lakes. A facility expansion project is planned to accommodate these additional flows, anticipated to begin in 2024.



With a design flow of 0.32 MGD and a mean reported flow of 0.224 MGD (excluding outliers) the Village of New Paris WWTP is typically experiencing flow rates at 70 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.2 and 0.25 MGD. Seven of sixty months from May 2017 through April 2022 exceeded 0.32 MGD on a monthly average. Since May of 2017 there have been 584 individual days (32% of days) during which reported flow exceeded 0.256 MGD (80% of capacity). There were 270 days since May 2017 during which the reported flow exceeded 0.32 MGD (100% of capacity) and of these 112 exceeded 0.384 MGD (120% of capacity). The facility reported 17 days with flow above 200% of capacity over these 60 months.

Coldwater Creek (05120101)



The Village of St. Henry facility in Mercer County serves the Burkettsville-New Weston FPA; the flows from Darke County are only a portion of flows to the facility. With a design flow of 0.867 MGD and a mean reported flow of 0.8584 MGD (excluding high and low outliers) the Village of St. Henry WWTF is typically experiencing flow rates at 99 percent of capacity. Annual average flow rates for the years 2018 through 2021 ranged between 0.81 and 0.97 MGD. Twenty-seven of sixty-two months from May 2017 through June 2022 exceeded 0.867 MGD on a monthly average. Since May of 2017 there have been 1,370 individual days (73% of days) during which reported flow exceeded 0.697 MGD (80% of capacity). There were 1,257 days since May 2017 during which the reported flow exceeded 0.867 MGD (100% of capacity) and of these 514 exceeded 1.04 MGD (120% of capacity). The facility reported 31 days with flow above 200% of capacity over these 62 months.

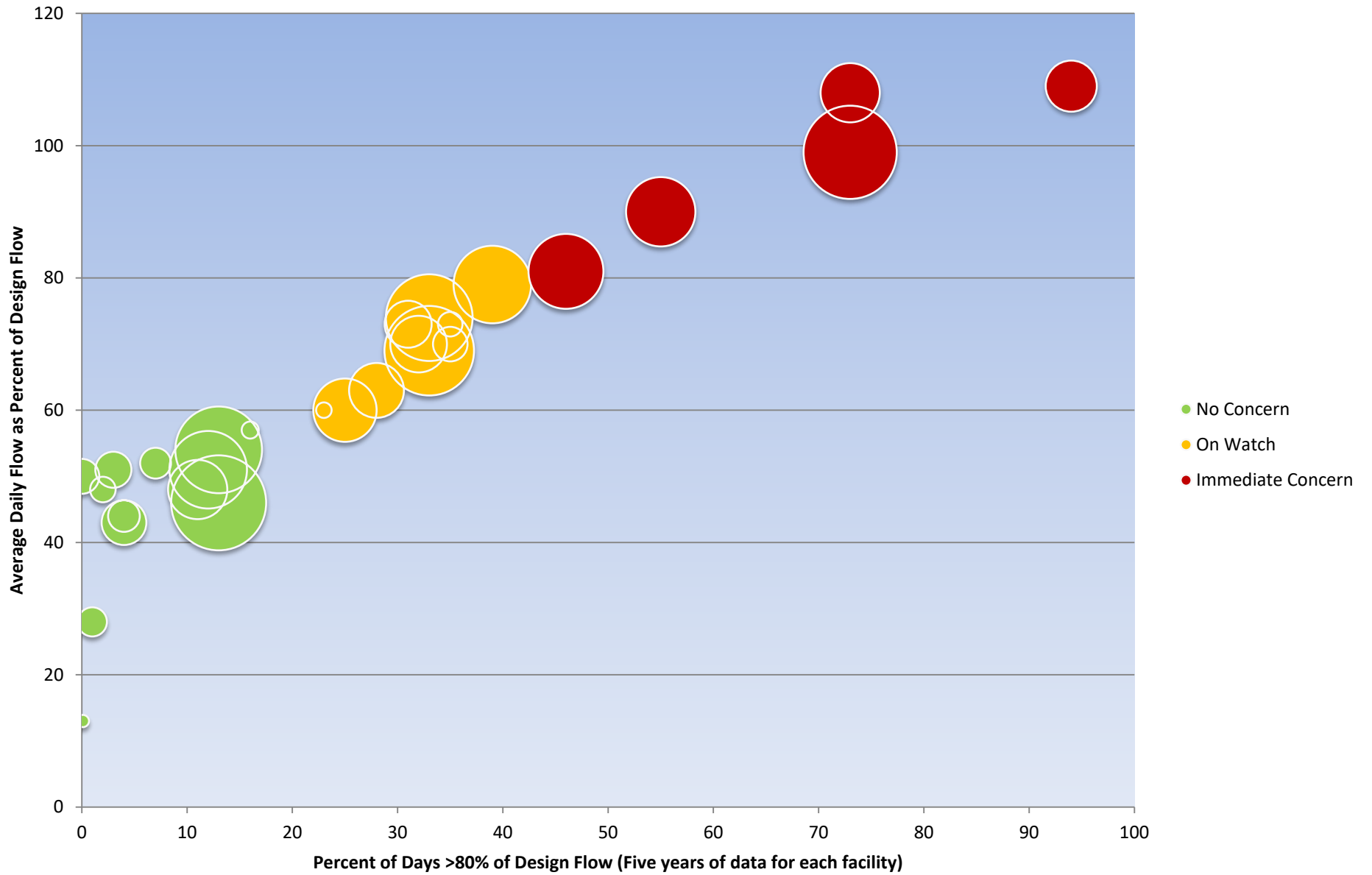
Summary Bubble Charts

The charts on the following two pages provide a visual summary of the individual facility data presented in the preceding section. The facilities are divided by Major and Minor facilities (as assigned by Ohio EPA). The points are color coded based on five-year average flow rates. The points are sized by the Design Flow of the facility.

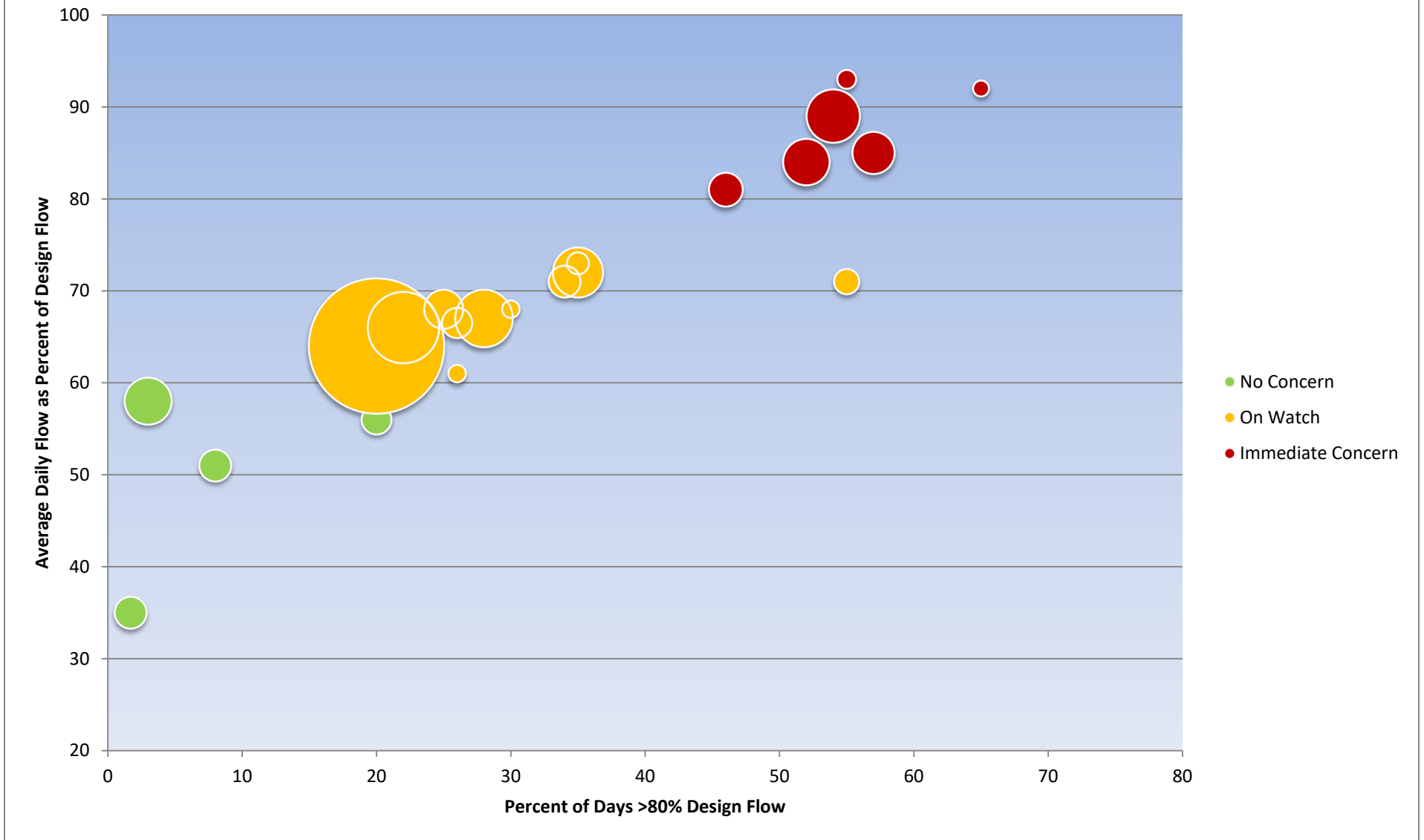
The data used for these bubble charts comes straight from the individual analyses of Flow Rate data from the treatment facilities. So, these charts represent averages from five full years of data.

Data tables follow the two charts.

Minor NPDES Wastewater Facilities in the Miami Valley



Major NPDES Wastewater Facilities in the Miami Valley



Bubble Chart Data Tables

Minor Facility Name	% Days above 80%	Avg Daily Flow	Design Flow (MGD)
Preble County No. 2*	0.1	13	0.015
Clifton	16	57	0.029
West Manchester	2	48	0.065
Verona	1	28	0.085
Pittsburg	7	52	0.095
Eldorado	4	44	0.1
Osgood	0	50	0.122
New Madison	3	51	0.13
Pleasant Hill	4	43	0.2
Camden	11	48	0.35
Lakengren	12	51	0.6
Covington	13	54	0.75
Jamestown	13	46	0.9
Rolin Acres*	23	60	0.024
Laura	35	73	0.06
Gratis	35	70	0.119
Farmersville	31	73	0.22
West Alexandria	28	63	0.3
New Paris	32	70	0.32
Arcanum	25	60	0.4
Yellow Springs	39	79	0.6
Versailles	33	74	0.75
New Lebanon	33	69	0.8
Lewisburg	94	109	0.261
Ansonia	73	108	0.35
Bradford	55	90	0.48
Cedarville	46	81	0.56
St. Henry**	73	99	0.867

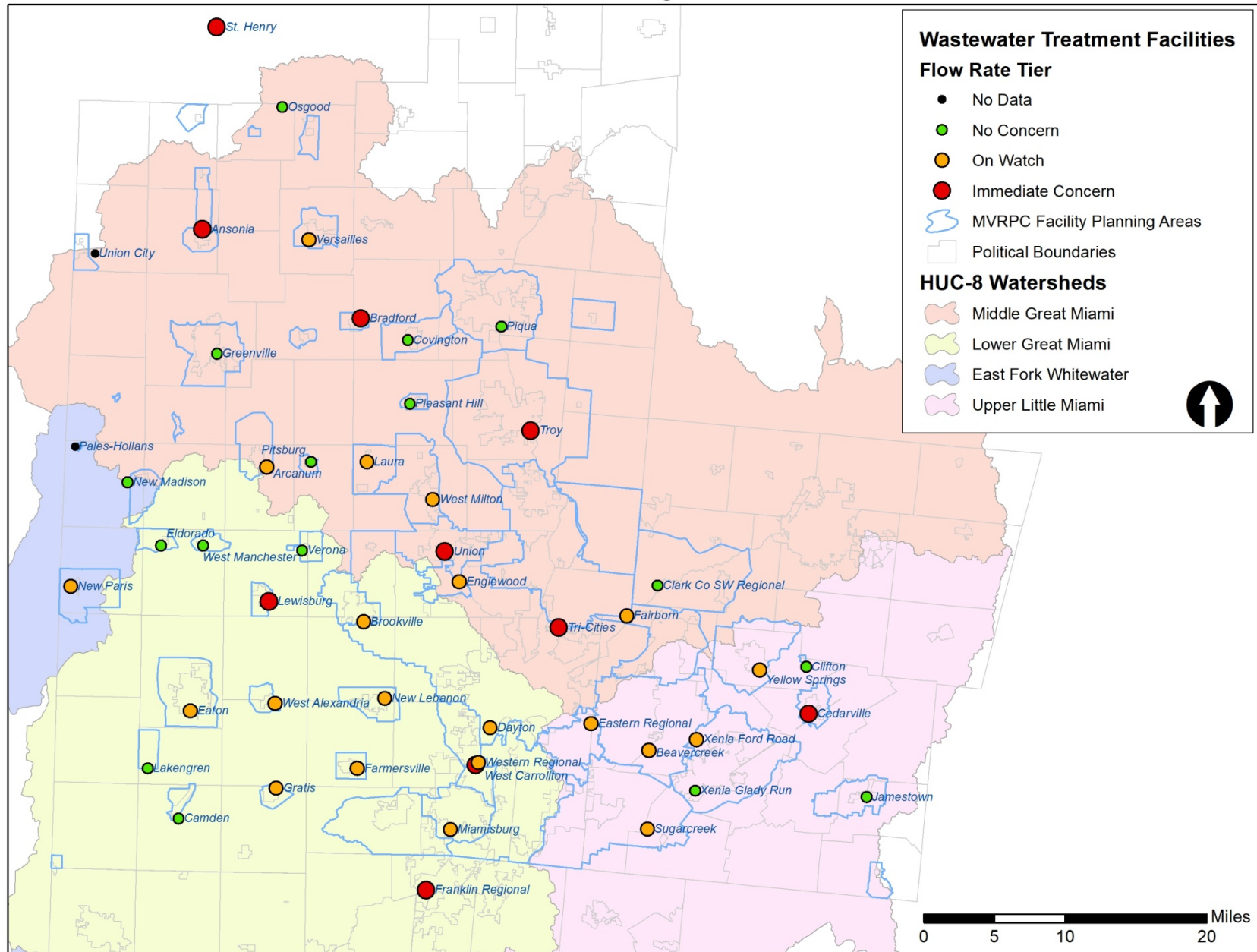
Major Facility Name	% Days above 80%	Avg Daily Flow	Design Flow (MGD)
Greenville	20	56	3.5
Clark Southwest Regional**	1.7	35	4
Xenia-Glady Run	8	51	4
Piqua	3	58	8.7
West Milton	26	61	1.2
Brookville	30	68	1.2
Eaton	35	73	1.9
Englewood	55	71	2.5
Xenia-Ford Road	26	66.5	3.6
Miamisburg	34	71	4
Fairborn	25	68	6
Sugarcreek	35	72	9.9
Eastern Regional	28	67	13
Western Regional	22	66	20
Dayton	20	64	72
Union	65	92	1
West Carrollton	55	93	1.4
Franklin Regional**	46	81	4.5
Troy	57	85	7
Beavercreek***	28	68	8.5
Tri-Cities	54	89	11.2

* Rolin Acres and Preble County No. 2 are minor permitted facilities that serve single subdivisions rather than Facility Planning Areas.

** Clark County Southwest Regional, Franklin Regional, and St. Henry serve FPAs within the MVRPC region as well as areas outside the MVRPC region. Thus flows from these FPA do not represent the total flows to these facilities.

*** Please see case study on rerate study for Beavercreek WRRF in Section 4.

Wastewater Treatment Facilities Serving MVRPC Areawide Communities



PTI Review for Facilities with Immediate Concerns

Since August of 2015, staff at MVRPC have reviewed on a weekly basis applications for permits-to-install received at Ohio EPA Southwest District Office for wastewater collection and treatment infrastructure. The table below lists the facility and the number of PTIs reviewed over the last seven years for those facilities. PTIs can be for a variety of project types, but projects serving new residential or commercial development represent new flows (of varying volumes) to be handled by these facilities.

Major/Minor	Facility Name	Average Flow Rate	PTIs Since August 2015	Notes
Major	Franklin Regional	81	5	Serves Germantown FPA plus additional areas of Warren County. PTI count is only for Germantown FPA. All five of these PTI appear to be for new sanitary sewer service
	Beavercreek	84	61	Fifty-four of 61 appear to be for new sanitary sewer service. Please see case study in Section 4.
	Tri-Cities	89	79	Serves the cities of Huber Heights, Tipp City and Vandalia. These are high growth communities and 70 of the 79 permits appear to be for new sanitary sewer service. Averages more than 10 PTIs per year.
	Troy	85	37	Thirty-three of these 37 permits appear to be for new sanitary sewer service. Averages about 5 PTI per year.
	Union	92	9	Eight of 9 PTI appear to be for new sanitary sewer service, particularly commercial/light industrial development in the vicinity of the Dayton International Airport. Averages just over 1 PTI per year.
	West Carrollton	93	3	All three of these PTI appear to have been for wastewater treatment facility improvements.
Minor	Ansonia	108	2	One of these PTI was for new sanitary sewer service. The other was for sewer rehabilitation and I&I removal.
	Bradford	90	3	Bradford facility serves the Villages of Bradford and Gettysburg. Only one of the three PTI appears to be for extending sanitary sewer service. No PTIs were reviewed within the Village of Gettysburg.
	Cedarville	81	2	Only one of the two PTI appears to be for extending sanitary sewer service.
	Lewisburg	109	2	Neither of the two PTI were for new sanitary sewer service. One was for phosphorus removal at WWTF.
	St. Henry	99	0	No PTIs reviewed in Burkettsville-New Weston FPA.

With only partial data for PTIs related to Franklin Regional it is not possible to discern the impact growth in the Germantown FPA may have on the facility Flow Rate as a whole. Of more obvious concern are developments in Tri-Cities FPA and the Troy FPA, where already-stressed facilities are experiencing new flows from 5 to 10 new developments per year.

PTI Reviews for Facilities “On Watch”

Major/ Minor	Facility Name	Average Flow Rate	PTIs Since August 2015	Notes
Major	Brookville	68	9	Eight of 9 appear to be for new sanitary sewer service.
	Dayton	64	51	Twenty-four of 51 appear to be for new sanitary sewer service.
	Eastern Regional	67	9	Seven of 9 appear to be for new sanitary sewer service, but several for a single new business. Also a new RV dump station at the facility.
	Eaton	73	7	Five of 7 for new sanitary sewer service, and the other two for improvements at the WWTF.
	Englewood	71	3	Only one of three PTI was for new sanitary sewer service.
	Fairborn	68	22	Nineteen of 22 appear to be for new sanitary sewer service. Two for bio-digester operations.
	Miamisburg	71	11	Just five of 11 appear to be for new sanitary sewer service. The others appear to be system maintenance.
	Sugarcreek	72	75	Seventy-four of 75 PTI appear to be for new sanitary sewer service, mostly for new residential development. High growth rate in this FPA. Averaging 10 per year.
	West Milton	61	6	All six appear to be for new sanitary sewer services, including for new connection to serve Ludlow Falls.
	Western Regional	66	45	This facility serves the Western Regional FPA and the Opossum Creek FPA. PTI figure reflects total for the two FPA. Thirty-three of the 45 PTI appear to be for new sanitary sewer services.
	Xenia – Ford Road	66.5	19	Xenia has two wastewater treatment facilities. This PTI data does not indicate to which WWTF the flows go. Thirteen of the 19 PTI appear to be for new sanitary sewer services.
	Arcanum	60	2	One appears to be for new sanitary sewer service.
Minor	Farmersville	73	0	
	Gratis	70	0	
	Laura	73	1	Duplicate of PTI issued to West Milton.
	New Lebanon	69	0	
	New Paris	70	1	Appears to be for new sanitary sewer service
	Versailles	74	17	Eleven of 17 appear to be for new sanitary sewer service.
	West Alexandria	63	1	For construction of a new WWTF
	Yellow Springs	79	5	Four of 5 appear to be for new sanitary sewer service.

Three facilities appear to be experiencing development growth that may be pushing them toward the “Immediate Concern” category: Sugarcreek, Western Regional and Versailles. Because they are not there yet, the communities have the time to consider the variety of tools to ensure adequate capacity into the future.

The Dayton, Eastern Regional, Fairborn, Xenia Ford Road and Yellow Springs facilities exhibit these same issues but to a more moderate degree. The remaining facilities do not appear to be under significant pressure from new development.

Section 4: Case Studies

Communities across our region have undertaken efforts to maintain sanitary sewer collection systems and to improve operations at waste treatment facilities. Below are two examples of work done to keep plant flows within manageable limits.

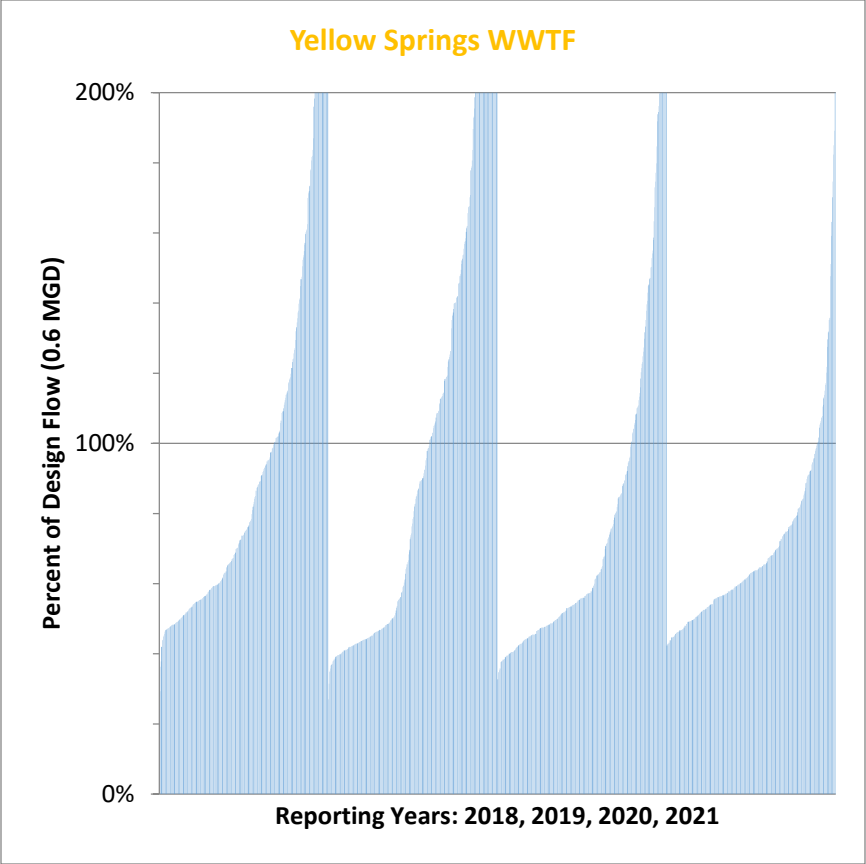
Village of Yellow Springs Inflow & Infiltration Project

Concerned about high flow rates exceeding the design flow of the village treatment facility and lift station overflows into Yellow Springs Creek, the Village of Yellow Springs undertook a multi-year project to reduce inflow of storm water into the sanitary sewer collection system. Starting in 2018 the Village began root control work to reduce and eliminate tree root intrusion into the collection pipes in over 44,000 linear feet of the system. Then 2020 was the first of three years (so far) of sewer line video inspection and cured-in-place pipe (CIPP) lining throughout the collection system.

Employing contractor support, the project video recorded and scored over 32,000 linear feet of sewer pipe over three years (2020-2022). Scores above 3.25 on the Pipeline Assessment and Certification (PACP) scale were prioritized for CIPP lining. By the end of 2022 the project will have lined over 14,600 linear feet of pipe.

The project also included inspection of maintenance hole access points in the system, to detect and repair locations where water intrusion may be occurring. This project complements ongoing efforts to work with village residents to correct intrusion issues on sewer laterals (which are private property) and to disconnect sump pumps from the sanitary sewer collection system.

The time period for this flow data review coincides exactly with the period in which the Village of Yellow Springs undertook this project to reduce flow volumes to the Yellow Springs WWTF. The graph and table below depict the outcomes of the project.



Yellow Springs WWTF Average Flow Rate as Percent of Design Flow, by Calendar Year			
2018	2019	2020	2021
104.4%	108.5%	81.2%	71.3%

This data includes only the years for which we have complete data for the year. These calculated averages do not exclude outliers. The beneficial nature of this project is evident in the significant reductions in average flow rates into the Yellow Springs treatment facility from year to year. 2021 saw flow rates drop by more than a third from their 2019 peak.

The cost for this project has been around \$290,000 per year for video recording, scoring and CIPP lining. Village staff report this is a more economical approach than sewer line replacement, and also far less disruptive for village residents. An additional benefit from the project has been fewer service call outs for blockages and backups in the sewer system, resulting in lower overtime costs for the utility.

For more information about the Yellow Springs Inflow and Infiltration Project, you may contact the Village of Yellow Springs administrative staff.

Beavercreek Water Resource Recovery Facility Re-Rate Study

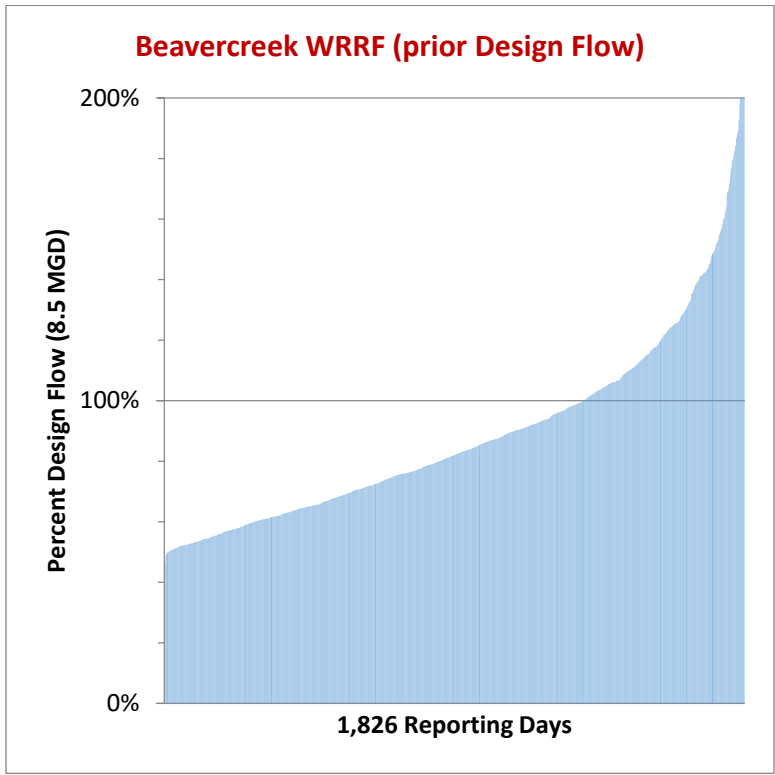
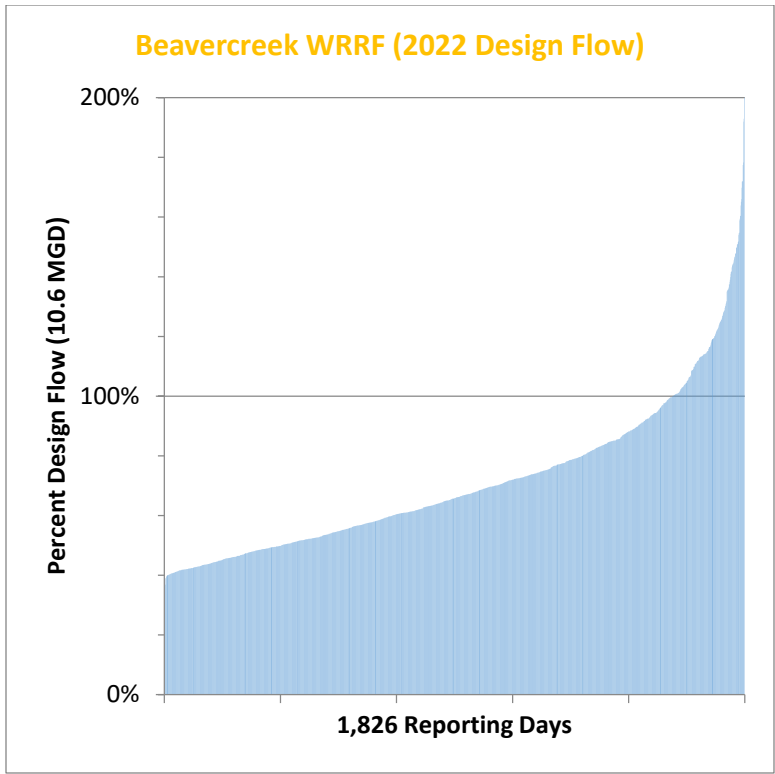
The Greene County Sanitary Engineering Department (GCSED) operates both drinking water treatment plants and water resource recovery facilities serving a majority of Greene County residents. A project to increase capacity and add a reverse-osmosis water softening process to the Northwest Regional Water Treatment Plant will result in increased flows to the Beavercreek Water Resource Recovery Facility. The softening process generates R.O. membrane concentrate reject water from membrane backwashing. Though other treatment or disposal options exist including direct discharge to a receiving stream or direct blending with the WRRF effluent, GCSED decided that directing this waste flow for treatment at the Beavercreek WRRF was the most environmentally responsible approach. This additional flow could be as high as 1.53 MGD at peak water plant production, so it would be a significant portion of the facility's rated design flow of 8.5 MGD.

At the same time, GCSED was certain that the rated design flow of 8.5 MGD was lower than the actual engineered capacity of the existing Beavercreek WRRF, and so it was decided to undertake a Re-Rate Study process to determine a more appropriate design flow to factor into the facility NPDES permit. GCSED contracted with an engineering consultant, CDM Smith, to conduct a complete review of technology, infrastructure and operations within both treatment plants at the Beavercreek WRRF to calculate a proposed new design flow.

The study report, completed in November 2021, described the treatment process at the facility, looked at current NPDES permit limits, examined the impacts of the pollution load from the new flows from the water treatment plant, and accounted for population growth projections. It examined the capacity of each stage of treatment in both the north and south treatment trains, the capacity of UV disinfection and sludge handling infrastructure, and provided a justification for a proposed design flow of 10.6 MGD. As a part of the study development process, GCSED asked for and received comments from the Ohio EPA Division of Surface Water.

With the completed study in hand, GCSED submitted applications to the Ohio EPA Division of Surface Water for a permit to install (PTI) for Plan Approval and an application to revise the Beavercreek WRRF NPDES permit to reflect effluent limits based on the higher design flow. This project did not require an Anti-Degradation review because GCSED did not request an increase in concentration or loading limits for any permitted pollutant. Rather, permit limits were reduced to compensate for the increased flow. This process did require a formal public comment period and hearing, and in total took about 6 months to complete. The modified permit, with the higher design flow and adjusted effluent limitations, became effective on April 1, 2022.

The graphs below compare the five year flow data from 2017 to 2022 in relation to the now-effective design flow of 10.6 MGD and the previous design flow of 8.5 MGD. Future capacity utilization for the Beavercreek facility will depend on future flows from the high growth community, and future precipitation trends. However, comparing past data to the higher design flow figure places the Beavercreek WRRF in the "on watch" category with average flow rates at 68 percent of capacity and only 28 percent of days at or above 80 percent of design flow.



For more information on the Re-Rate Study process, contact the Greene County Sanitary Engineering Department.

Section 5: Conclusions

PTI Reviews. The current language of the Areawide Water Quality management plan does not mention limits related to “Flow Rate as a percentage of Design Flow.” Therefore consideration of PTIs with respect to AWQMP consistency cannot factor in the typical operating conditions of the facility. However, PTIs for new sanitary sewer service (which will increase flows to the receiving plant) should be carefully considered by the applicant prior to submission when they are proposed to be connected to WWTF listed as an “Immediate Concern.” Similarly, PTIs located in high growth FPA associated with WWTF that are listed as “On Watch” should be weighed against the future cost of plant upgrades to treat future flows.

The timing of new permitted flows should be coordinated with the timing of planned future projects to increase capacity or prevent I&I.

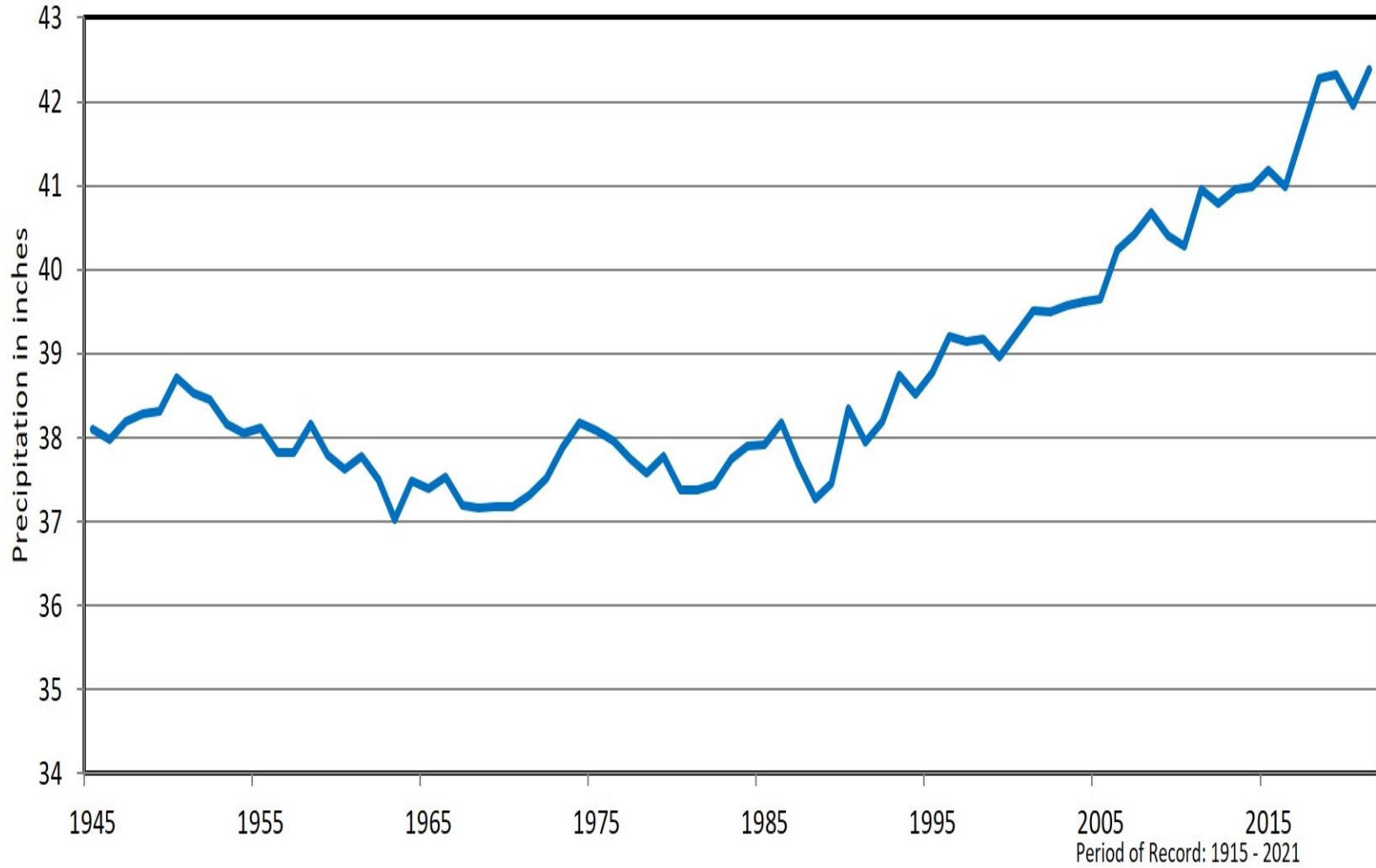
Future iterations of the AWQMP could consider prescriptive language that would relate consideration of new development to typical operating conditions at the facility.

FPA Boundary Changes. Requests for changes to FPA boundaries are generally prompted by an expected new development and the need to provide such development with sanitary sewer services. It can generally be assumed that boundary change requests will result in increased flows for the associated WWTF, though the timing for such new flows may vary from request to request. The available capacity for wastewater treatment is a required factor in consideration of boundary change requests, and this Review can serve as a starting point for understanding the available capacity of the subject facility. Further discussion with the Designated Management Agency for the facility will likely be needed to more fully understand the ability of the facility to accept the flows associated with the proposed new territory. It would be prudent to request from Ohio EPA the most current 60 months of Flow Rate data each time a new boundary change request is under consideration.

Facilities listed as “Immediate Concern” will have a higher bar to clear to establish an ability to provide environmentally protective service to new ground and new development. Those listed as “On Watch” will also need to provide an understanding of how current operations and future plans will keep the facility from the “Immediate Concern” category after enlarging the FPA.

Planning for the effects of Climate Change. The Miami Conservancy District (MCD) has maintained a network of precipitation monitors within the Great Miami Watershed, with 28 monitors having more than 75 years of records. The figure below, provided by MCD, displays the clear upward trend since about 1990 in annual precipitation in the watershed. The figure is based on data from 42 monitoring stations.

Moving 30-Year Mean Annual Precipitation for the Great Miami River Watershed

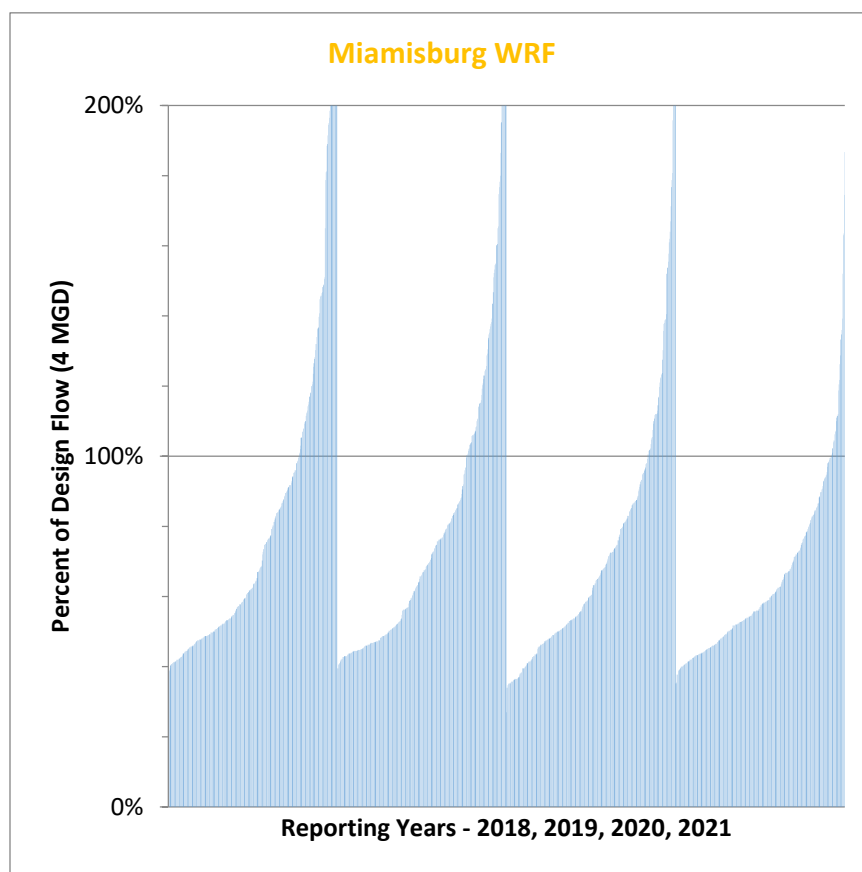


Source: The Miami Conservancy District

Average annual rainfall has increased by over four inches in the Miami Valley since the 1980's. MCD reports that the 30-year average rainfall increased between 2010 and 2020 by more than 1.5 inches (from 40.30" to 41.92").⁴

The data analyzed for this report is of too short a timespan to depict these long term trends. The only years with complete data were 2018-2021. In fact, MCD data on annual rainfall for the years 2018 to 2021 show a *decreasing* trend (while still above the 1991-2020 average in all four years). But even that trend is not consistently visible in flow rate data. Modified flow rate data charts are shown below and on the next page for Miamisburg and Tri-Cities. These charts sort the flow rate reports by year, and show a mixed trend in relation to precipitation data. The flow rate data cannot definitively be tied to the precipitation data.

Regional data from the Miami Valley affirms the National Climate Assessment's prediction of increased precipitation. The prediction of increased large storms and extreme events is another long term trend that should be accounted for in planning for future upgrades to wastewater treatment facility capacity.

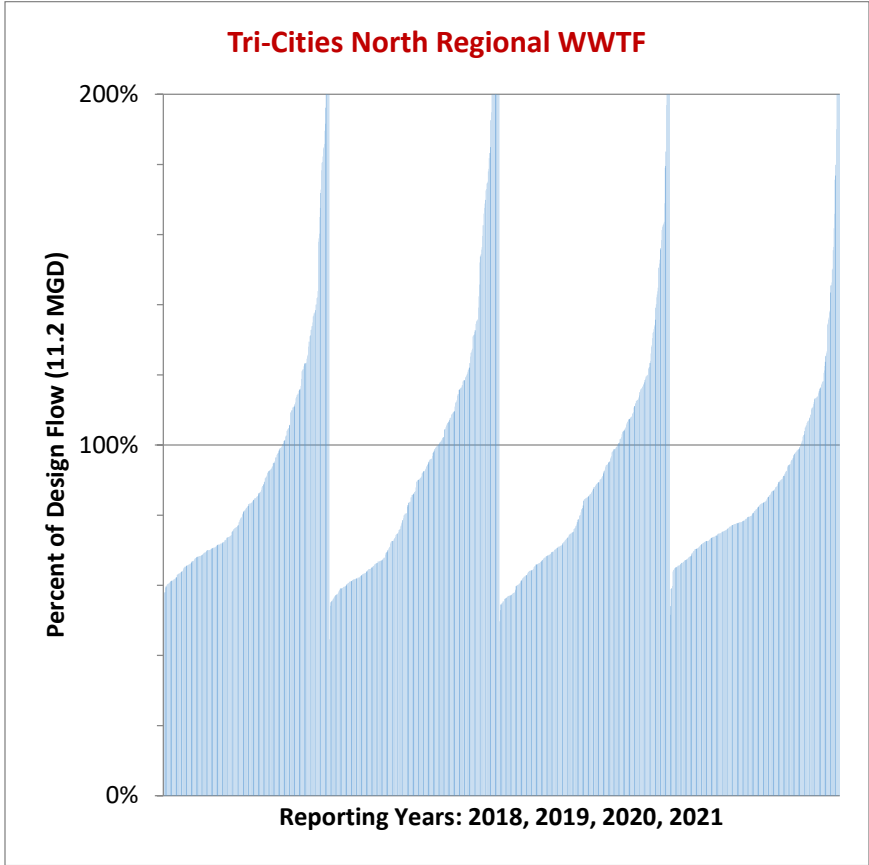


Miamisburg WRF Average Flow Rate as Percent of Design Flow, by Calendar Year⁵			
2018	2019	2020	2021

⁴ Miami Conservancy District Annual Report 2021, pp. 69-76.

⁵ These annual Average Flow Rate figures do not exclude outliers, as Climate Change is expected to result in more outliers.

83.3%	79.0%	72.9%	64.7%
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Tri-Cities WWTF Average Flow Rate as Percent of Design Flow, by Calendar Year ⁶			
2018	2019	2020	2021
93.8%	100.1%	92.7%	91.4%

⁶ These annual Average Flow Rate figures do not exclude outliers, as Climate Change is expected to result in more outliers.