

ENVIRONMENTAL SERVICES

INTRODUCTION

The Department of Environmental Services (DES) is comprised of two operating divisions and three support groups. The water and wastewater operating divisions consist of the surface water treatment plant (WTP), groundwater treatment and wells (wells) and the water pollution control facility (WPCF). These facilities are supported by a central maintenance group, analytical staff, and administrative staff.

The WTP and wells are staffed by six (6) operators. The WPCF is staffed by seven (7) operators. The Chief Operator, Lead Operator, Laboratory Supervisor, and Operations Program Manager support functions at both the WTP and WPCF. The central maintenance group is staffed by six (6) employees including the Maintenance Supervisor, Senior Plant Mechanic, three (3) plant mechanics, and one (1) Plant Maintenance Worker. The administrative staff consists of two (2) employees, the Assistant Director and Administration Support Officer. The total number of DES employees at the end of FY18 was 23 full time employees.

The primary function of the WTP and wells are to treat the surface and groundwater sources to the extent required to meet federal and state drinking water standards. Surface water from Lake Pelham is treated at the WTP located on Woodview Road. Groundwater is pumped from six wells with three located in the Mountain Brook Subdivision, two wells located off of Nalles Mill Rd. and one well located at Rockwater Park.

The primary function of the WPCF is to treat wastewater from domestic, commercial, and industrial sources as required by the state issued VPDES permit for discharge of the treated effluent into waters of the State of Virginia. A supporting function of the WPCF is to provide treatment and disposal of residual solids separated from the wastewater during the treatment process. Treated effluent from the WPCF is discharged directly into Mountain Run.

DEPARTMENTAL GOAL AND OBJECTIVES

The goal of DES is to support the Town's strategic plan in a manner that will result in providing potable water and treated wastewater effluent and support services in a safe, continuous, and reliable manner at the most cost effective quality levels through the efficient use of resources.

The Water and Wastewater Enterprise Funds business objectives were divided into the major areas of operational, financial, and business maintenance and development functions.

The effectiveness and efficiency of the department can be measured and monitored by several means including operational performance, financial, and business development. To accomplish this, the report has been formatted into the following sections:

Operational Performance Results

Section I WTP / Well / WPCF production performance as compared to the previous year's performance and current year's demand for services

Section II WTP / Well / WPCF compliance with regulatory, quality, and safety requirements as required by Department of Health, DEQ, EPA, OSHA, and Town of Culpeper

Financial Results

Section III Enterprise Fund financial performance as compared to the FY17 budget

Business Maintenance & Development Results

Section IV Facilities maintenance and development

Section V Personnel development, utilization, and performance

**SECTION I
RESULTS OF PLANT OPERATIONS**

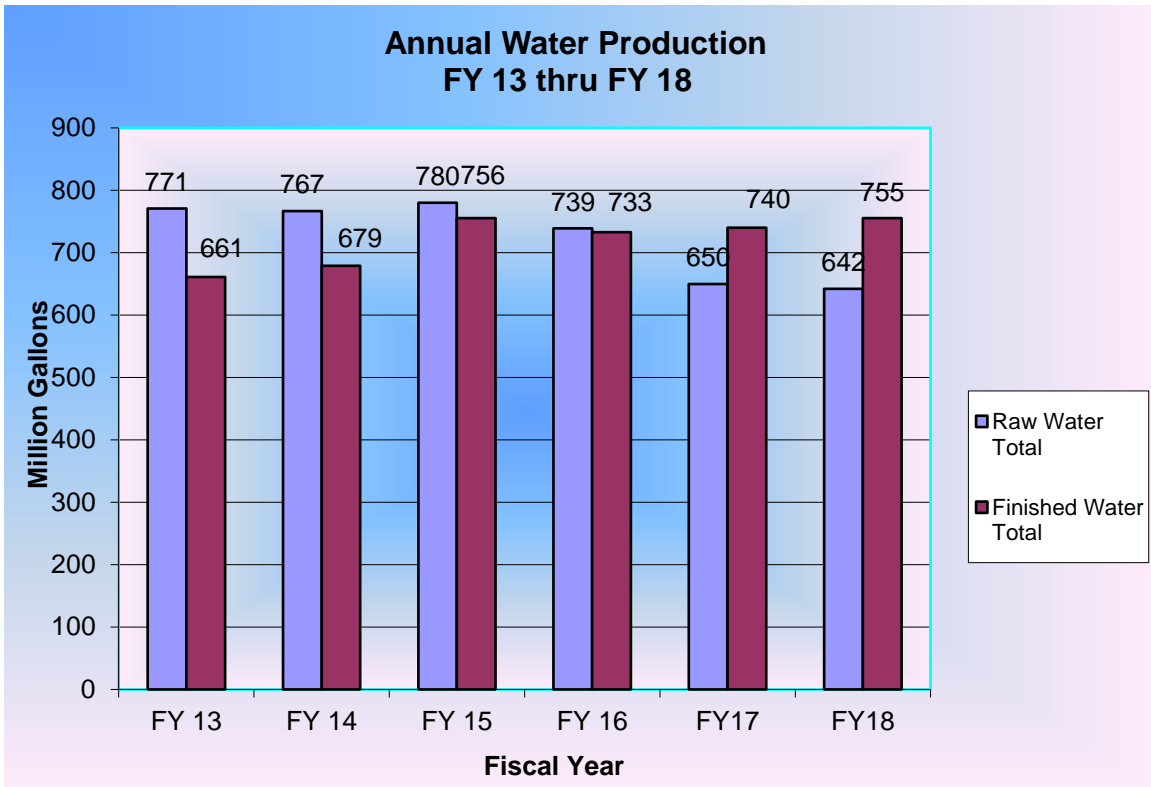
WATER TREATMENT PLANT & WELLS

SUMMARY OF OPERATIONAL DATA

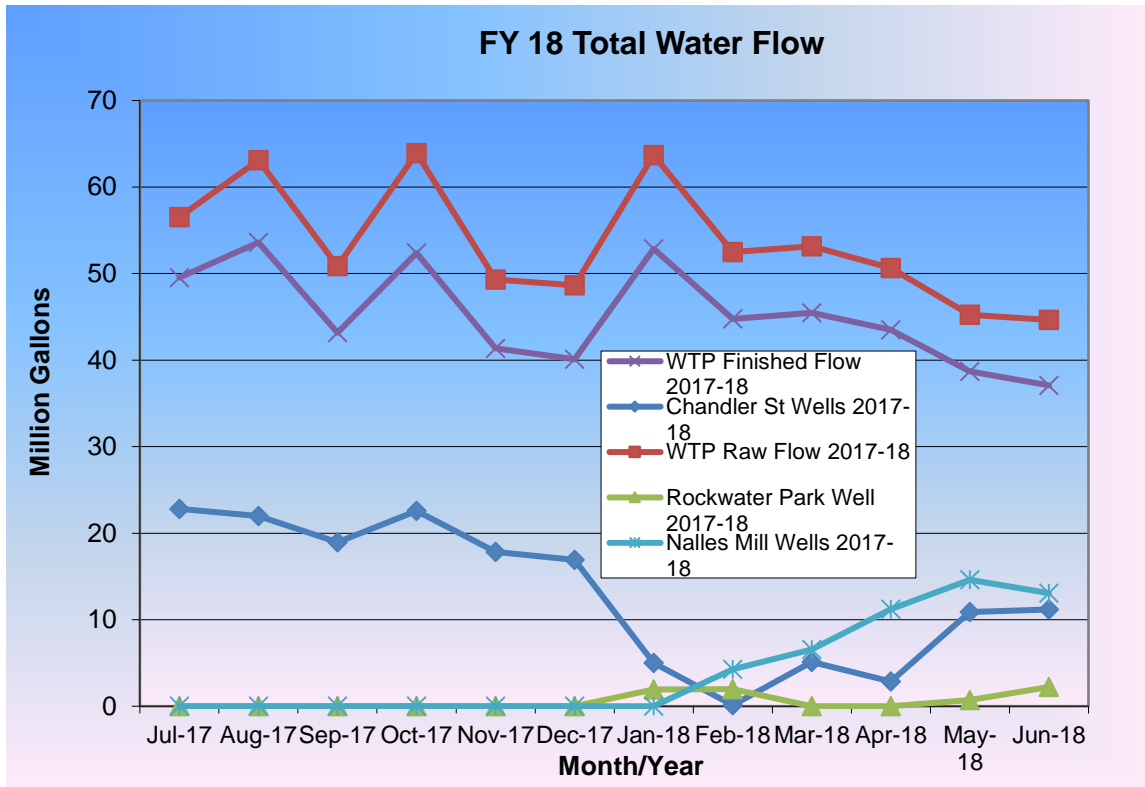
| | <u>FY17</u> | <u>FY18</u> |
|--|--------------------|--------------------|
| Total water processed from Lake Pelham (million gallons) | 650 | 642 |
| Finished water supplied from the WTP (million gallons) | 535 | 542 |
| WTP average daily flow of finished water (MGD*) | 1.5 | 1.5 |
| WTP peak daily flow of finished water (MGD*) | 3.2 | 3.1 |
| WTP surface water capacity (MGD*) | 4.0 | 4.0 |
| Days Surface WTP operated | 365 | 365 |
| Total well water processed (million gallons) | 204 | 213 |
| Peak daily flow of well water (MGD*) | 1.06 | 1.6 |
| Average well water processed daily (MGD*) | 0.56 | 0.58 |
| WTP and well combined totals (million gallons) | 740 | 755 |

* MGD – million gallons per day

The available water treatment capacity was able to meet peak and average customer demands resulting in potable water being supplied on a continuous basis to system customers through FY18.



Raw water totals are based upon surface water treated at the WTP. The Chandler St. wells were placed in service in January 2015. The Rockwater Park well was placed in service in January 2018. The Nalles Mill wells were placed into service in February 2018. Finish water totals include both the WTP and Wells combined for FY15, FY16, FY17, and FY18.



The Town met the Partnership for Safe Drinking Water plant optimization and water quality goals for FY18. Meeting this nationally recognized voluntary goal established by AWWA and EPA demonstrates optimal removal of contaminants in the water including bacteria and viruses for improved safety.

WATER POLLUTION CONTROL FACILITY (WPCF)

SUMMARY OF OPERATIONAL DATA – Wastewater Treatment

| | <u>FY17</u> | <u>FY18</u> |
|--|--------------------|--------------------|
| Total wastewater effluent flow (million gallons) | 1071 | 1050 |
| Average daily flow (MGD) | 2.9 | 2.9 |
| Peak daily flow (MGD) | 6.8 | 12.6 |
| Plant Capacity | 6.0 | 6.0 |
| Rainfall (total inches/year) | 48.7 | 50.5 |
| Days WPCF operated | 365 | 365 |

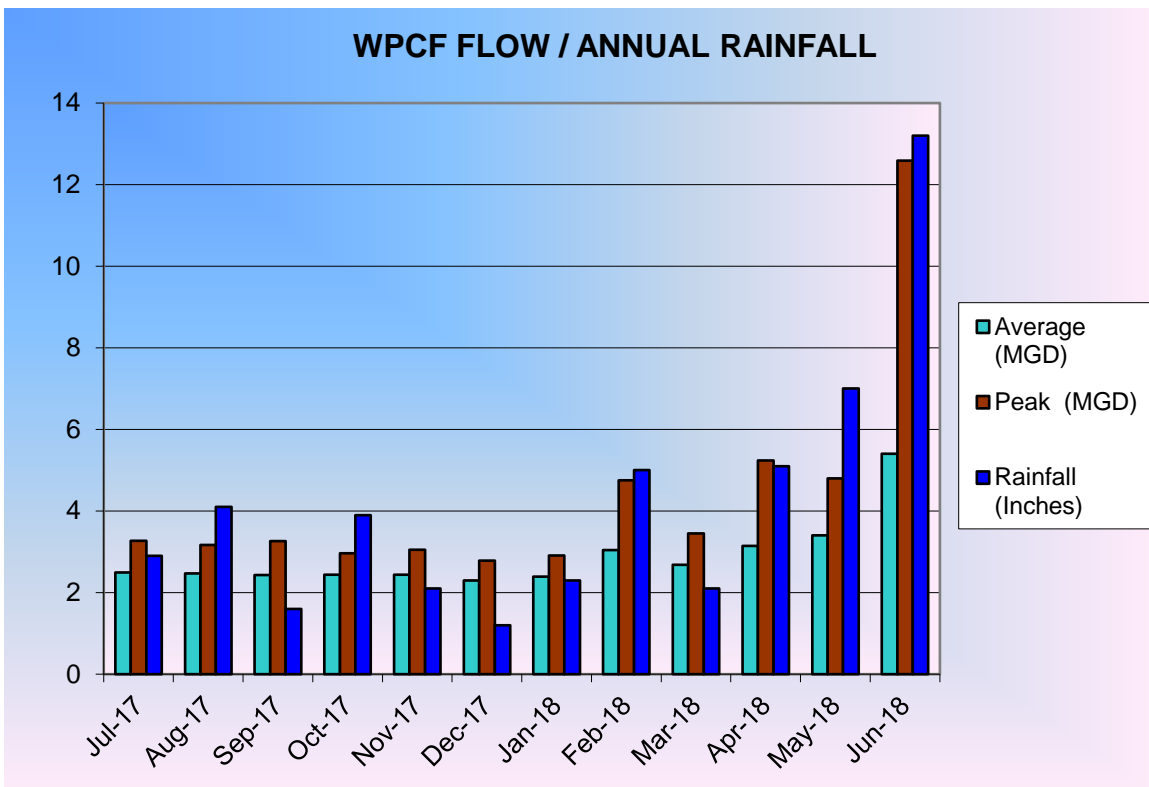
SUMMARY OF OPERATIONAL DATA – Solids Processing

| | <u>FY17</u> | <u>FY18</u> |
|------------------------------|--------------------|--------------------|
| Total dry tons of bio-solids | 636 | 704 |
| Gallons of septage processed | 75,908 | 266,970 |

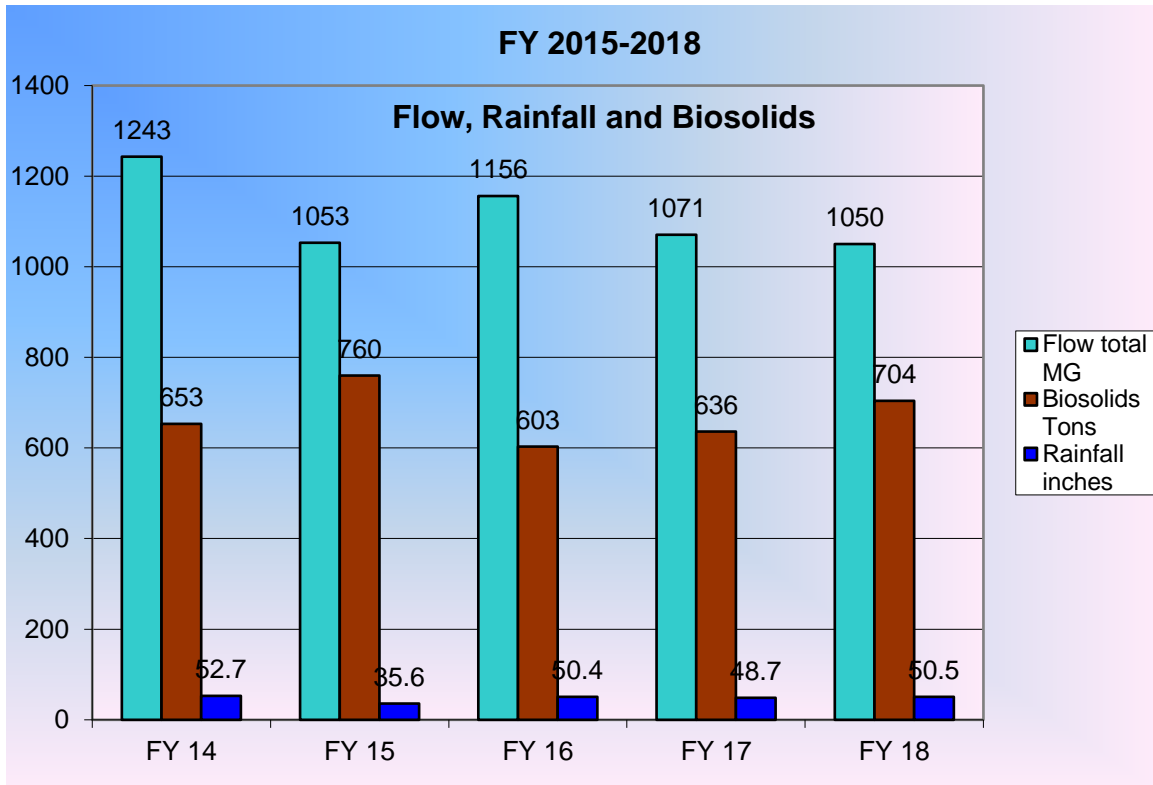
The WPCF is operated on a three shift, 24 hour basis. In order to comply with the new Chesapeake Bay Nutrient Reduction Regulations, a major plant upgrade was required to meet nutrient limits by December 2010. This upgrade was completed in April 2010 increasing the plant capacity to 6 MGD and providing for the required nutrient removal.

FY18 was the seventh full year of operation with the completed plant upgrade and new permit limits. The WPCF effluent quality was in compliance with all permit limits during this fiscal year.

The inflow and infiltration reduction program continues to make progress. Operations staff have noticed peak flows have lessened. FY18 had one month with a rainfall in excess of 10 inches. For the year, only one month recorded a system peak flow exceeding 6 MGD. During FY18, the Town of Culpeper contracted A.J. Conner to line sewer piping in the vicinity of Oaklawn Drive and on the Lake Pelham connector trail. In conjunction with scheduled system maintenance, sewer rehabilitation will continue for detecting and correcting collection system failures that can result in peak flow conditions at the WPCF.



Centrifuge operation required for solids processing averaged 70 hours per week for FY18. The removal efficiency for organic solids remained at 99% in FY18 as measured by carbonaceous biochemical oxygen demand (CBOD₅) and suspended solids.



SECTION II REGULATORY, QUALITY AND SAFETY COMPLIANCE

WATER TREATMENT PLANT

Regulatory Compliance

Monthly Plant Operations Summaries were submitted as required to the Department of Health, Office of Drinking Water. The Plant also published and distributed the annual Consumer Confidence Report to all water system customers.

The Town is required to have an approved Cross Connection Control Program/Backflow Prevention Program. This program is to ensure the safety of the potable water supply from contamination from backflow events. This program was updated and submitted to VDH for review and approval during FY17.

Water Quality Testing and Compliance

There were no water quality or compliance issues during FY18.

Safety Compliance – Accidents & Incidents

There was one lost time accident or safety related incident reported during FY18.

WATER POLLUTION CONTROL FACILITY

Regulatory Compliance

During the past fiscal year, there were no overflows in the plant and no system overflows. All monthly VPDES Discharge Monitoring Reports were submitted on time and as required.

Regulatory Compliance Programs

The pretreatment program, which is used to manage Significant Industrial Users (SIU), was successfully maintained during FY18. There were five permitted industrial users in the program; none of the five permittees were cited as being in significant noncompliance during FY18. All Significant Industrial Users and Categorical Industrial Users met the requirement to write and implement a Slug Control Plan. At the end of FY18 the Fats, Oil, and Grease (FOG) program had approximately 100 active permits.

The Storm Water Program, which is used to manage storm water at the WPCF, Public Works and Light and Power facilities was successfully maintained during FY18. The Town has two Storm Water Permits. A Total Maximum Daily Loading (TMDL) Action Plan was written and is being implemented to address contaminant loading exceedances at the Light and Power facility.

The WPCF has an Air Permit which is used to ensure that the facility is in compliance with Federal and State Air Regulations. This permit was successfully maintained during FY18.

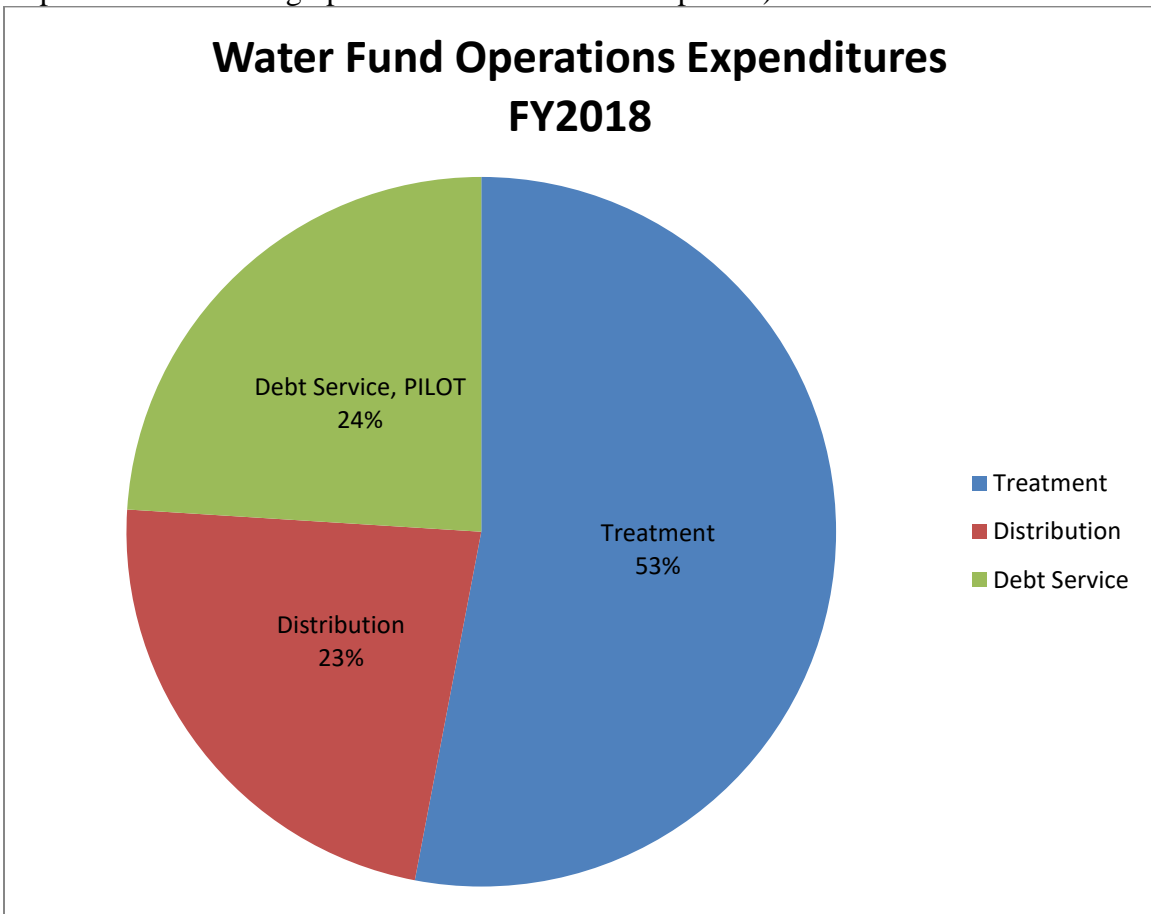
Wastewater Quality Testing Compliance

The upgrade has allowed plant staff to reduce nutrient levels to less than 3.0 mg/L Total Nitrogen and 0.3 mg/L Total Phosphorous. The improved treatment has also allowed the plant to meet permit parameters for BOD₅ (biochemical oxygen demand), CBOD₅ (carbonaceous BOD₅), TKN, Ammonia, E. coli, and Total Suspended Solids.

SECTION III ENTERPRISE FUND PERFORMANCE

WATER ENTERPRISE FUND

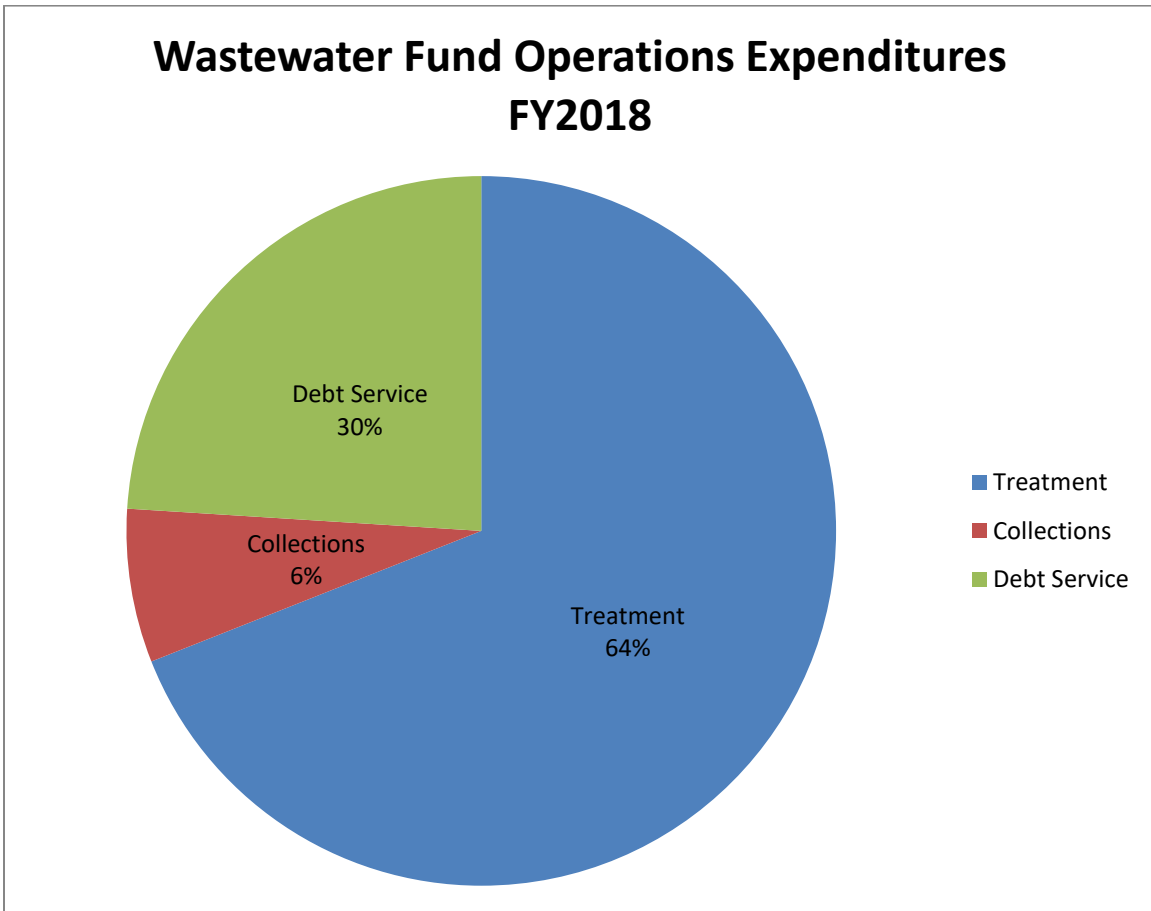
The Water Enterprise Fund consists of the Water Distribution Division and the Water Treatment Division. Based on the June 30, 2018, Preliminary Budget Report, the Water Fund operations expenses were below total revenue resulting in a positive operating margin of \$688,584. This does not include capital expenditures of \$11,733,236 which was partially funded by prior year borrowing and partially funded from reserves. For accounting purposes, the Water Enterprise Fund operations expenditures for accounting purposes were divided into three major cost groupings. The Water Treatment Division expenditures were the largest of the three cost groupings accounting for 53% of the total Water Enterprise Fund operating expenditures. (Refer to Water Fund Operations Expenditures – FY18 graph for allocation of fund expenses).



The Water Enterprise Fund financial performance was deemed successful for the year with combined operating fund expenditures being approximately 2% under budgeted expense level.

WASTEWATER ENTERPRISE FUND

The Wastewater Enterprise Fund consists of the Wastewater Collection Division and the Wastewater Treatment Division. Based on the June 30, 2018, Preliminary Budget Report, the Wastewater Fund operations expenses were below total revenue resulting in a positive operating margin of \$1,237,771. This does not include capital expenditures of \$102,081 which was funded out of the FY18 operating margin shown above. For accounting purposes, the Wastewater Enterprise Fund operations expenditures were divided into three major cost groupings. The Wastewater Treatment Division expenditures continued to be the largest of the three cost groupings accounting for 64% of the total Wastewater Enterprise Fund expenditures. (Refer to Wastewater Fund Operations Expenditures – FY18 graph for allocation of fund expenses).

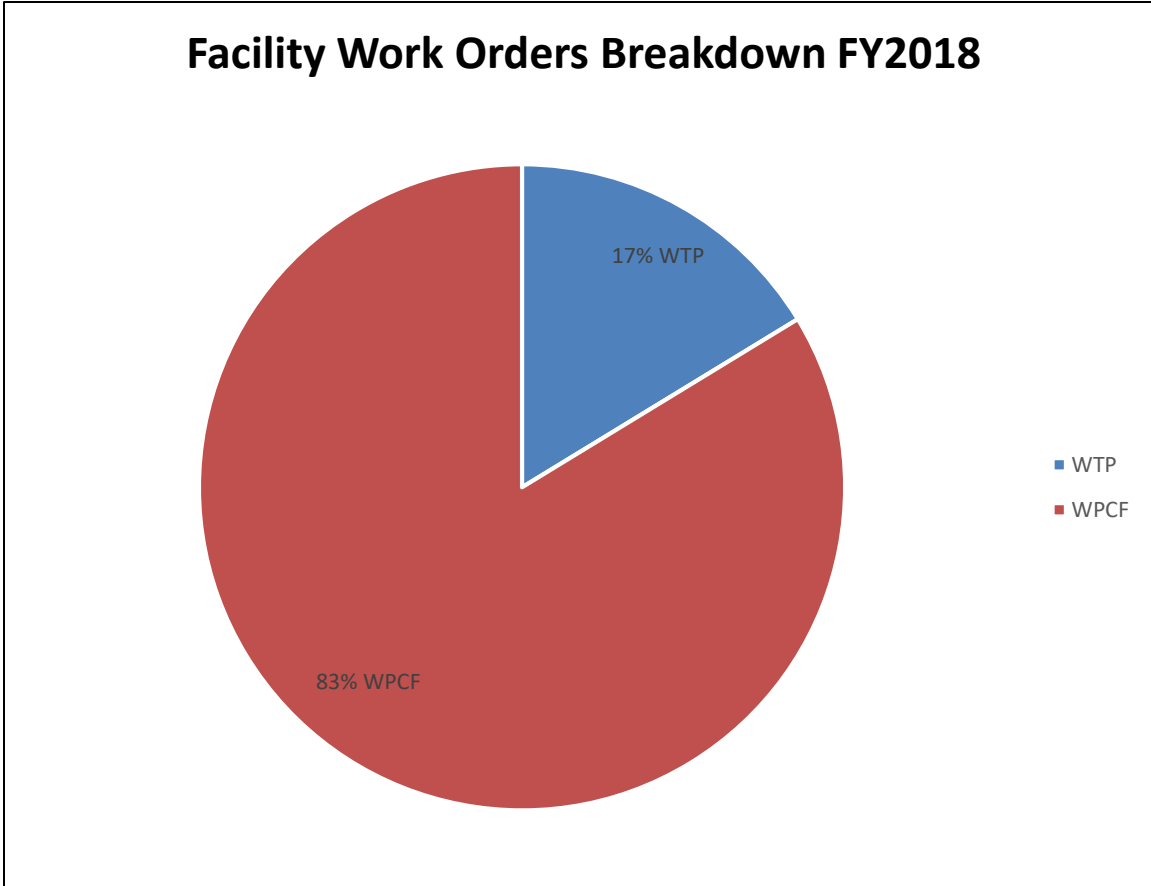


The Wastewater Enterprise Fund financial performance deemed successful for the year with combined fund operating expenditures being approximately 3% under budgeted expense level.

SECTION IV FACILITIES MAINTENANCE AND DEVELOPMENT

Facilities Maintenance

The Environmental Services Maintenance Division conducted many routine repairs, PM's, and calibrations in support of operations. The Division assisted in the start-up of the new potassium permanganate pump station, the start-up and commissioning of two new wellfields and chemical pump stations at Rockwater Park and Nalles Mills Road. Staff also helped commission a new sewage pumping station at Roger's/Braggs Corner. The Division completed the disposal of all remaining sludge from the digester cleaning project that was conducted the prior year. The Division installed new security cameras at Rockwater Park and the potassium permanganate pump station. Additionally, staff installed new pumps at the HPZ pumping station to include the fabrication of a new SCADA control panel for the HPZ water tank project. The Division also upgraded the WPCF NPW pump to a submersible pump system for phasing out old hollow shaft turbine pumps.



Work flow was managed utilizing a web based preventive maintenance program. A total of 3473 work orders were received in addition to numerous verbal work requests.

Facilities Development

Water Source & Treatment Facilities

A Regional Water Supply Plan was completed by in-house personnel in FY12. The Plan reported that the usable portion of the water supply safe yield for Lake Pelham and Mountain Run Lake may be considerably less than the safe yield that was previously reported in the 2004 Water Supply Study as 5.1 MGD. As the average demand and more importantly the peak month demand for the water approach 50% of total watershed capacity the need to expand the water source became evident. Since the development of an additional surface water source can take decades to complete and cost in excess of \$50,000,000, the Town began a groundwater study to address emergency and long term needs in FY11. Town staff are working with the County and DEQ in updating this plan in FY19.

During FY13, a well field containing three wells was secured with a safe yield of 0.9 MGD (1.2 MGD during short term emergencies). These wells were connected into the system during FY15. Due to the success of this groundwater investigation, Council authorized staff to expand the study area. Geophysical Investigation of the expanded study area was completed and 5 additional production wells were drilled in FY14 with a safe yield anticipated to be 1.5 MGD (2.0 MGD during short term emergencies). Three of these additional production wells on two separate sites were secured and developed with the design and construction of treatment and distribution facilities. These three new groundwater production wells were connected to the Town system in FY18.

Annual Groundwater Level and Water Quality Monitoring Program

This Program will ensure that the long-term Groundwater Use Management Plan is protecting the availability and usability of groundwater resources for the local community.

Dam Rehabilitation Projects

Due to changes in the Virginia Dam Safety requirements, significant improvements will be required to both Lake Pelham and Mountain Run Dams. An evaluation of the dams was started in FY12, with recommendations being finalized in FY13 with a resulting cost estimate of approximately \$16.5 million to repair both dams. Results were submitted to DCR and NRCS along with a grant funding request for these repairs.

USDA-NRCS awarded the Town two grants totaling \$890,000 to develop rehabilitation plans for both dams. Additionally, in FY15 the Town received grants of approximately \$10,700,000 from USDA-NRCS and \$2.9 million from Virginia DCR to assist with the dam rehabilitation design and construction. Design was completed in FY17 with construction beginning in July 2017 and anticipated to be completed in FY19, weather permitting.

The Town of Culpeper in cooperation with The Ole County Store and Bakery opened a new public boat landing at Lake Pelham Adventures in July 2017, due to the existing boat ramp being temporarily closed during dam renovations. Additionally, Lake Pelham

Adventures was expanded adding a kayak and paddle boat launch, gazebo, office trailer, parking, and paddle boats. Lake Pelham Adventures offers canoes, kayaks, paddle boards, paddle boats, and a gazebo for hourly or daily rental to the public.

Potassium Permanganate Feed Facility

The Lake Pelham Dam rehabilitation project will eliminate access to the existing treatment facility requiring the facility to be relocated. During FY17, design was completed and construction began on this new facility with construction completed in July 2017. Since the project was required in support of the dam rehabilitation, the project is eligible for grant matching funds from USDA-NRCS (65%) and Virginia DCR (17.5%).

High Pressure Zone (HPZ) Water Storage Tank

During FY18, the Town negotiated and executed agreements with Three Flags, LLC and LifeSpire (formerly Virginia Baptist Home) to fund the design and construction of a 400,000 gallon pedisphere water tank and associated distribution for the southern water service area. Per the agreements, Three Flags, LLC provided \$1 million in funding. LifeSpire provided \$500,000 in funding. Phoenix Fabricators and Erectors, Inc. was awarded the construction contract for this project with a low bid of \$1,656,900, and a stipulated completion date of May 31, 2018. This water storage tank was designed to improve fire flow protection to area customers including LifeSpire and two elementary schools. Including engineering design, inspection and tank graphic logo costs, the total value of this project was about \$1.8 million. The project was substantially completed and released to operations on June 1, 2018.

**SECTION V
PERSONNEL UTILIZATION, DEVELOPMENT & PERFORMANCE**

The total employee count of 23 remained unchanged during FY18. WTP operations required the staffing of two shifts while the WPCF continued to be staffed by three shifts on a 24 hour basis.

A complete listing of assigned personnel water and wastewater licensure follows:

**DEPARTMENT OF ENVIRONMENTAL SERVICES
LICENSEURE/NEW EMPLOYEES**

| <u>EMPLOYEE</u> | <u>CLASS OF LICENSE</u> |
|------------------|---|
| Robert Hester | Class I Water/Class III Wastewater/Aquatic Pesticide Applicators License |
| Jim Hoy, P.E. | Professional Engineer/Class III Water/Class II Wastewater |
| Neil Moore | Class I Wastewater |
| Justin Newton | Class III Water |
| Larry Olsen | Class III Water |
| Danny Jeffries | Class III Water |
| Mike Swindler | Class IV Wastewater |
| David Olsen | Class IV Wastewater |
| Robert Cheney | Class II Wastewater/Class II Water |
| Joey Blankenship | Class III Water/Class III Wastewater DPOR Master Plumbing |
| Detric Murray | Class II Wastewater |

NEW EMPLOYEES

| | |
|--------------------|--------------------------------|
| Anne Payne Brooks | Laboratory Supervisor |
| Michelle Lillard | Wastewater Operator Trainee |
| Steven Christensen | Wastewater Operator Trainee |
| Hawar Hawarry | Wastewater Operator Trainee |
| Clayton Naccarato | Water Operator Trainee |
| Winter Edwards | Administrative Support Officer |