Hallsdale-Powell Utility District

Capacity, Management, Operation & Maintenance (CMOM) Program

2017 Annual Report

HALLSDALE-POWELL UTILITY DISTRICT

TABLE OF CONTENTS

TABLE OF CONTENTS - APPENDICES

SECTION 1.0 - 2017 CMOM PROGRAM SUMMARY

A. Certification Statement

This 2017 Annual Report is submitted to fulfill the requirements of Hallsdale-Powell Utility District's (HPUD's) Consent Order #WPC-14-0044 as agreed upon in August 2014. This Consent Order is a legal agreement between the Tennessee Department of Environment & Conservation (TDEC) and HPUD. The purpose of the Consent Order is to address sanitary sewer overflows (SSOs) in the HPUD sanitary sewer system in an effort to improve water quality throughout HPUD service area. In accordance with the 2014 Consent Order, this report details the results of activities undertaken during the annual reporting period beginning January 1, 2017 and ending December 31, 2017.

The format of this report will follow the outline presented within the Table of Contents and is presented in response to the information requested in the Consent Order. All pertinent and supplemental data, maps and background documentation will be retained on file in the main office located at 3745 Cunningham Drive, Knoxville, Tennessee and is available upon request.

Dave Campbell
Signature

3-29-2018
Date

B. Purpose and Scope

The CMOM Annual Report provides a summary of CMOM Program activities (past and planned) and is intended to be a communication tool. The report is intended for District staff, regulatory authorities, customers, and the general public. The report serves four general purposes:

- To provide an annual overview of the activities completed under the CMOM Program;
- To describe and document changes to the CMOM Program on an annual basis, which may include changes to objectives, strategies, and performance measures;
- To describe the activities that are planned or currently being undertaken to support the CMOM Program;
- To continue compliance with the August 2014 Agreement between the District and State of Tennessee, Department of Environment and Conservation (TDEC) which requires that HPUD provide an annual report regarding implementation and performance of the CMOM program.

C. Overview of HPUD Infrastructure

HPUD's wastewater system serves approximately 23,657 wastewater customers and covers an area of roughly 147 square miles. The District runs from North Knox County into Union County and extends into portions of Anderson County.

The District has more than 1,000 miles of water and sewer mains buried below the 147 square miles of service area. HPUD maintains 21 wastewater pumping stations, 9,555 manholes, and operates a 9.6 million gallon-per-day (MGD) wastewater treatment plant, which uses an advanced membrane bioreactor treatment technology.

Figure 1. HPUD's Wastewater Infrastructure

No. of Sewer Connections	23,657
Service Area	147 square miles
Wastewater Treatment Plants	2
Decentralized Treatment Plants	2
Rated Treatment Plant Capacity	9.6 million gallons per day
Daily Max WWTP Flow	18.5 million gallons per day
Treated Wastewater	2.7 billion gallons per year
Wastewater Lift Stations	21
Sewer Manholes	9,555
Force Main & Gravity Sewer	474 miles

D. Roles and Responsibilities for CMOM Program

The Sewer Collection Department, under the direct supervision of the Collection System Superintendent, includes a staff of full-time employees who divide their time between operation and maintenance of the sewer collection system. HPUD's Manager of Collection and Distribution Systems also devotes significant time to the management and oversight of the sewer collection system.

Figure 2. Roles and Responsibilities for CMOM Program

Title	Role or Responsibility
Board of Commissioners	Develops policy for District
General Manager	Manages all personnel, procurement, budget, operations, and management of HPUD departments and activities
Manager of Collection & Distribution	Oversees water distribution, sewer collection and construction activities
Sewer Operations & Maintenance	Oversees sewer & manhole inspections, sewer cleaning and repairs, recommends rehab and implements SORP
Collection Systems Coordinator	Manages Sewer Rehab Program, CMOM Compliance and PMI Program
Education & Outreach Coordinator	Oversees education and outreach efforts with schools, residents, and local businesses

E. CMOM Program Overview

The CMOM Program provides a method for HPUD to document current activities that are intended to help HPUD achieve goals related to control or elimination of sanitary sewer overflows, to improve effluent quality, and to ensure adequate system capacity. As part of this effort, HPUD has completed this 2017 annual review of the Program in conjunction with evaluating the performance measures outlined in the Program.

HPUD's CMOM Program includes the following components:

1. Management Plan
2. Performance Measures and Management Review
3. Data and Asset Management
4. Capital Improvements Plan (CIP)
5. Sewer Overflow Response Plan (SORP)
6. Fats, Oil & Grease (FOG) Program
7. System Evaluation and Capacity Assurance Plan
8. Communication Plan

1. Management Plan

The CMOM Program Annual Report provides a summary of CMOM Program activities. The report is intended for District staff, regulatory authorities, customers, and the general public. HPUD's CMOM Management Plan describes the approach that the District is undertaking to ensure all necessary activities and programs are in place in order to support the CMOM Program.

Each year, the annual report details the progress toward meeting objectives of the Plan. Following is a list of the some of the major accomplishments that have helped move the CMOM Program forward:

- Continued implementation of the Collection System Preventative Maintenance Inspection (PMI) Program in order to identify, pinpoint, and prioritize areas of the collection system that need rehabilitation or replacement;

- Use of the Geographic Information System (GIS) data as the basis for the asset management system for collection system & treatment plant infrastructure.

2. Performance Measures and Management Review

The review of the performance measures is intended to be an evaluation of the District's status with respect to achieving its CMOM objectives. The purpose of the performance measures is to track District activities over time and gauge achievement of CMOM program objectives. Some of these performance measures have been selected as key measures to gauge the overall performance of HPUD in the areas of collection system operations and maintenance and capacity assurance. The CMOM Management team held its annual review of the program on January 11, 2018 to evaluate the goals and objectives of the CMOM program and review Performance Measures. ***(See Attachment 1: Performance Measurement Spreadsheet).***

3. Data and Asset Management

Throughout 2017, the District continued to improve asset management processes and data quality and accuracy. The District continued to make improvements to the process of tracking capital project costs at the asset level in 2017. Several years ago, HPUD worked with a consultant to develop "PIMS", a project information management system.

PIMS is used to track engineering project budgets, contracts and payments, project financial summaries, construction inspection logs, bids, permits, project assets and engineering drawings. In addition to project data, there are also modules for SSO tracking and Backflow prevention records.

HPUD continues to utilitze Cityworks and Geographic Information System (GIS) to track and evaluate assets. Cityworks is used to track customer issues, service requests, and work orders HPUD receives on a daily basis. HPUD uses GIS to track and locate upgrades and changes to the sewer system. HPUD also uses GIS as a tracking and assessment tool for PMI which helps evaluate assets to develop rehabilitation projects. These rehabilitation projects are then entered in the Combined Rehab database and shown in GIS

4. Capital Improvement Plan (CIP)

HPUD utilizes the 5-year Capital Improvements Plan (CIP) to ensure adequate financial resources are set aside to fund required components of the sewer capital improvements plan. The CIP is discussed in more detail in Section 5.0 of this report and a summary of the plan is included in Appendices as ***(See Attachment 2: Sewer System Capital Improvements Plan (CIP)).***

5. Sanitary Sewer Overflow Response Plan (SORP)

The Sanitary Sewer Overflow Response Plan (SORP) describes the measures the District has put in place for response, containment, clean up, stream sampling and analysis, public notification and regulatory reporting of overflows in the collection system. The SORP details the steps to be taken when a potential overflow is identified, categorization of whether it is a wet weather or dry weather SSO, and if it reaches State Waters.

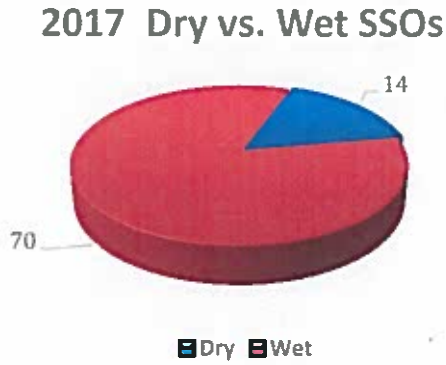
Historically, the District has collected data about pipe defects, line blockages, mechanical or electrical equipment problems, and inflow and infiltration, which are the primary causes of sanitary sewer overflows. The Sewer Operations and Maintenance Superintendent has a dedicated staff that oversees operation and maintenance activities in the collection system, including SSO response and clean up.

The Sewer Operations and Maintenance Superintendent maintains the SSO tracking system in the PIMS Database. Overflow data is also incorporated into the GIS. The following section of this report details specifics about SSO data captured during this reporting period. ***(See Attachment 3: 2017 SSO locations map)***

a. Summary of SSO Data

HPUD is undergoing adjustments to both the data input and output processes for Cityworks to generate more precise data for use in these annual reports. For the 2017 calendar year, there were a total of 84 SSOs (Jan 1, 2017 to Dec. 31, 2017) due to either operational issues or wet weather events throughout the HPUD service area. A total of 70

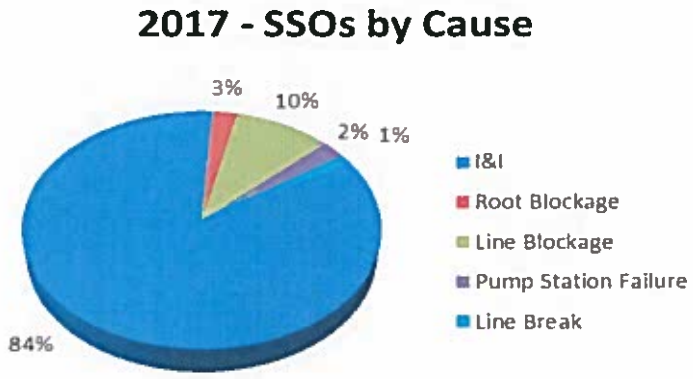
of the discharges were due to wet weather events and attributable to inflow/infiltration. The other 14 discharges were dry weather overflows as reflected in the following chart.



Of the 14 recorded dry weather SSO events during the 2017 annual reporting period, most were caused by operational issues such as line blockage, roots, or debris. The majority of the SSO's (70) were caused by wet weather issues attributed to inflow and infiltration. All SSOs are documented in the PIMS database and in the GIS and are periodically reviewed to identify if any problems exist that warrants the need for a larger-scale inspection or rehabilitation project.

b. Summary of SSO Events by Cause

All SSOs, regardless of the cause, are immediately responded to and the problems are remediated as soon as possible. Parts of the collection system, where blockages occur, are put on a cleaning program to be inspected and cleaned as needed, or placed on a schedule for rehabilitation or replacement. The following chart depicts a summary of SSO events by cause for the 2017 calendar year.



6. Fats, Oil & Grease (FOG) Program

HPUD has continued to outsource grease trap inspections. Since late 2009, HPUD has contracted with Robert G. Campbell & Associates (RGC&A) to conduct grease and grit trap inspections. For the calendar year of 2017, RGC&A conducted 502 inspections on 157 businesses. The frequency of the inspection varies as to the type of business and whether follow up inspections are necessary.

Contracting with a third party for inspections and management of the program has enabled HPUD Collection System staff to be more effective in the operation and maintenance of the collection system. HPUD staff periodically review inspection reports and update the written FOG Program as often as necessary.

7. System Evaluation and Capacity Assurance Plan

The Capacity Assurance Plan was submitted to TDEC on March 17, 2015 and HPUD received approval on May 23,2015. In response to TDEC's review of HPUD's System Evaluation and Capacity Assurance Plan, HPUD continues progress toward meeting the following objectives:

- Continue to address HPUD's Infiltration and Inflow (I/I) problem;
- Continue to identify collection system rehabilitation priorities;
- Complete Capital Improvement Projects (Three phase project for upsizing and replacing the Beaver Creek Interceptor);

- Continue the Preventative Maintenance Inspection (PMI) program;
- Continue with pump station improvements;
- Continue calibration and monitoring of HPUD's nine (9) permanent flow monitoring stations.

One of the tools utilized to develop the District's System Capacity Analysis Plan is HPUD's collection system hydraulic model. With its development in 2005, the HPUD collection system model has been periodically updated over the last 10 years to reflect the ongoing improvements to the collection system assets. Flow characteristics are calibrated by utilizing rainfall and flow monitoring information data. HPUD has nine permanent flow monitoring stations with three rain gauges currently in place. The most recent update and calibration of the model occurred in September 2014.

The updated and calibrated collection system hydraulic model was used to perform the capacity assessments. The objectives of the capacity assessment included the following objectives:

- Identify locations and causes of hydraulic constraints in the collection system;
- Assess the Beaver Creek WWTP ability to accommodate/treat peak flows,
- Assess how existing sewer system performance will be improved by planned rehabilitation and improvement projects, and
- Assess the performance of planned rehabilitation projects to accommodate future population growth.

8. CMOM Communication Plan

The CMOM Communication Plan documents the types and frequency of communications that are prepared and distributed regarding the status of the CMOM Program and the CMOM Annual Report. The District maintains communication with the Tennessee Department of Environment and Conservation (TDEC), the Board of Commissioners, HPUD employees, and HPUD customers on a regular basis.

The Board of Commissioners meet monthly to determine policy issues related to finance, personnel, operations, water and sewer system improvements, and other HPUD business. HPUD utilizes its quarterly customer newsletter, "WaterWorks", the CMOM Annual Report, and a dedicated website, www.hpudactnow.org, to inform customers about projects related to the sewer collection system.

Annual meetings are held which include a presentation of HPUD's CMOM program, information about upgrades at the wastewater treatment plants, upgrades to collection system infrastructure, and a summary of data collected from inspections of the collection system.

The past year's activities included communication of the CMOM Program to the public through articles in the customer newsletter, at an annual Citizen's Academy, held on September 9, October 18 and November 1, and at a presentation to the Board of Commissioners in upcoming months.

SECTION 2.0 - COMPLETED, ONGOING AND PLANNED PROJECTS

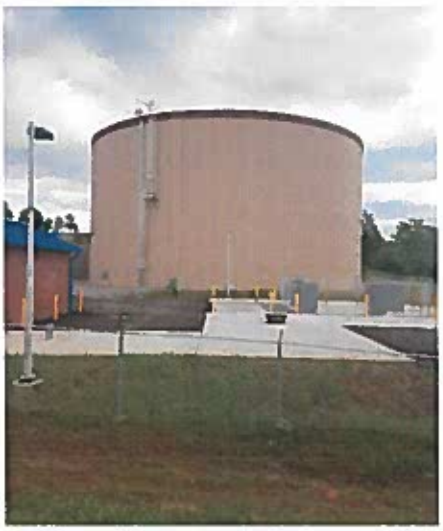
A. Completed, Ongoing, and Planned Collection System Projects

The major collection system projects that were completed in 2017 included the following:

1. Dry Gap Pike Sanitary Sewer Overflow Tank;
2. Preventative Maintenance & Inspection (PMI) Program 2016-2017 project;
3. Flow Monitoring - Long Term/Permanent;
4. Sanitary Sewer Rehabilitation Project - Phase 4;
5. Beaver Creek Interceptor Replacement - Phase 1 & 2;
6. Beaver Creek Interceptor Replacement – Phase 3;
7. Brown Gap Interceptor Replacement;
8. Downtown Powell Sewer Improvements;

1. Dry Gap Pike Sanitary Sewer Overflow Tank

Construction began on the 5 MGD storage tank in August 2015. Robert G. Campbell & Associates (RGC&A) were the design engineers, and the general contractor was J. Cumby Construction, Inc. The Dry Gap Sanitary Sewer Overflow Tank was designed to help alleviate sanitary sewer overflows during peak flow events when the sewer system is overwhelmed by heavy rainfall of high intensity and/or long duration.



The Dry Gap Tank was constructed on land owned by HPUD where the former Dry Gap Water Treatment Plant was located. This site was chosen based on engineering and design estimates obtained from system hydraulic modeling, which determined ideal placement of the tank to help alleviate chronic wet weather SSOs. The tank was completed and online in February 2017. The tank has diminished the SSOs in the area during average rainfall events and was put into use twelve times during 2017. The project was funded through the Clean Water State Revolving Fund (SRF).

2. Preventative Maintenance & Inspection (PMI) Program

In 2006, HPUD established a Preventative Maintenance and Inspection (PMI) Program to target problematic areas in the collection system to help prevent sanitary sewer overflows (SSOs). The Preventative Maintenance and Inspection activities include techniques such as manhole inspections, smoke testing, closed-circuit television (CCTV) inspection, pre-conditioning, and pipeline cleaning.

Results of these investigations have been captured digitally and integrated into HPUD's Geographic Information System (GIS). A final summary report was prepared detailing the problems found and the priority in which they should be addressed. HPUD continued this program into FY 2017 by completing 664 manhole inspections and cleaning and/or closed-circuit television (CCTV) inspection of 149,457 linear feet of sewer pipeline. ***(See Attachment 4 : Annual PMI inspections from 2006 to 2017 map).***

a. 2016-17 PMI – HP08 & HP06

HPUD extended and expanded the 2016-17 PMI contract with Compliance Envirosystems (CES) as a result of unused funds from the original contract. The focus of this project is concentrated in sub-basin HP08 and basin HP06. Both sub-basin HP08 and basin HP06 have been identified as areas with excessive infiltration from temporary and permanent flow monitoring projects.

The additional scope of work includes the cleaning and inspection of approximately 154,215 linear feet of sanitary sewer mains ranging from 6" – 24" in diameter using closed-circuit television (CCTV), and the inspection of approximately 670 manholes by the pole camera inspection method. The purpose of the additional scope of work is to identify any infiltration

and/or other defect that would contribute to SSOs or negatively affect the sanitary sewer system.

HPUD will use the inspection information to address any defects found during the inspection of these line segments. The inspections began in December 2016 and were completed in November 2017. ***(See Attachment 5 : 2017 Contractor CCTV Inspections map)***

3. **Flow Monitoring**

One of the key tools for enabling Hallsdale-Powell Utility District to analyze the performance of the sewer collection system is flow monitoring. Since 2004, HPUD has maintained continuous Flow Monitoring Units throughout the collection system. These flow monitoring devices have been installed within selected manholes at locations which are able to provide the best information to HPUD about how the collection system is performing on dry days and wet weather days.

During 2017, the Hallsdale-Powell Utility District continued long-term flow monitoring at nine locations, along with rainfall monitoring at three locations. During 2017, the average flow observed was 7.0 million gallons per day (mgd). HPUD saw a peak flow of 21.96 mgd and low flow of 4.34 mgd. ***(See Attachment 6: Long-Term Flow Monitoring Locations map)***

4. **Sanitary Sewer Rehabilitation Project - Phase 4**

Hallsdale-Powell Utility District entered into a contract with Jacobs Engineering on a sanitary sewer rehabilitation project which focused largely on repairs throughout the District. The contract began on August 16, 2017 with Insituform Technologies LLC. as the prime contractor for the job. The project duration is approximately 18 months. The project consisted of mainline rehabilitation, mainline point repairs, service connection repairs, and manhole rehabilitation. ***(See Attachment 7: Sanitary Sewer Rehabilitation - Phase 4 map)***

Rehabilitation Method	Unit	Project Quantities
Cured In Place Pipe (6"-18" dia.)	Linear Feet	43,040
Pipe Bursting (6"-12" dia.)	Linear Feet	1,550
Point Repairs (6"-12" dia.)	Each	190
Service Connections	Each	450
Manholes	Veritical Feet	2,450

5. **Beaver Creek Interceptor Replacement - Phase I & 2**

Phase 1 Scope: The Beaver Creek Interceptor Improvement Project consists of replacing the existing 36-inch diameter interceptor beginning at the Beaver Creek WWTP and continuing for approximately 10,900 linear feet into the HPUD collection system near Powell Presbyterian Church in Powell.

The existing interceptor will be replaced with a new 48-inch diameter interceptor, accompanying manholes and other structures, 300 linear feet of sewer line near West Emory Road and Clinton Highway, and 2,200 linear feet of sewer line replacement. An additional 14,500 linear feet of lines and manholes are planned to be rehabilitated as part of the project.

The project bid on February 7, 2018 and was awarded to Twin K Construction. The project is scheduled to begin in spring 2018 with an expected duration of approximately 30 months to complete.

Phase 2: The Beaver Creek Interceptor Improvement Project Phase 2 is the continuation of replacing the existing 36-inch diameter interceptor from where Phase 1 stopped approximately 12,000 linear feet to Morton View Lane.

The project is currently in final design and obtaining easements.

6. **Beaver Creek Interceptor Replacement – Phase 3**

Hallsdale-Powell Utility District entered into a contract with Jacobs Engineering on a sanitary sewer rehabilitation project that focused largely on repairs throughout the District.

Phase 3: The Beaver Creek Interceptor Improvement Project continues the replacement of the existing 36-inch diameter interceptor from behind Morton View Lane to the east side of Interstate 75. This projects will consist of approximately 5,000 linear feet of the new 48-inch diameter interceptor along with the improvement of smaller diameter pipes in the area.

The design and easements for the project have been completed. It is currenly awaiting a funding source to proceed.

7. **Brown Gap Interceptor Replacement**

In addition to replacing and upsizing the Interceptor near Beaver Creek WWTP, HPUD is working with Robert G. Campbell & Associates (RGC&A) to replace the Interceptor on the upper end of the district. The initial project will start at Brown Gap Road and go upstream Beeler Road. The project will consist of upsizing approximately 10,000 linear feet of 15-inch pipe. RGC&A are currently working on the design and obtaining easements.

8. **Downtown Powell Sewer Upgrades**

Hallsdale-Powell Utiltity District is working with Robert G. Campbell & Associates (RGC&A) to design a project that will focus on the upgrade of the sanitary sewer in downtown Powell. This project will focus on rehabilitating the sewer mains, service connections and manholes. This project is project to begin late 2018.

B. Completed, Ongoing and Planned Wastewater Treatment Plant Projects

Beaver Creek Solids Handling Project

In 2015, CTI Engineers, Inc. completed a study of solids handling improvements at the Beaver Creek WWTP which included return activated sludge/effluent hydraulic improvement, review of waste solids projections and operations, development of long-term options, capital costs, life-cycle costs for solids improvements, review of RAS/effluent piping performance, coordination of field investigation, and recommendation of modifications.

Based on this study, preliminary and final design was completed in 2016 for the implementation of the recommended solids handling improvements. A construction contract was bid and awarded in May 2016 to Smith Contractors, Inc. of Lawrenceburg,

KY. Construction ended in December 2017, and the facilities are now operational. The photos below summarize the major improvements to the Solids Handling at the Beaver Creek Wastewater Treatment Plant.

New Covered Sludge Storage Pad

New Jet Aeration Blowers

Renovated Digesters with Jet Aeration

New Decanting Centrifuges

C. <u>Completed, Ongoing and Planned Pump Station Projects</u>

Pump station reliability continues to be a focus of the HPUD collection system improvement efforts. The District's Capital Improvements Plan (CIP) has provisions for continued upgrades and rehabilitation of existing pump stations. HPUD personnel will continue to monitor the pump station's performance within the collection system to determine if any sites will require major rehabilitation in future years. HPUD is currently scheduled to upgrade the Blakewood pump station in spring of 2018.

SECTION 3.0 - SUPPLEMENTAL ENVIRONMENTAL PROJECT

Overview of HPUD's SEP - As Ordered by Consent Order WPC 140004

Per Section XV 6(a) of WPC 14-004 received by HPUD on 8/24/14, the District was permitted to submit a Supplemental Environmental Project in lieu of a civil penalty of $23,100. HPUD's original submission for the SEP was made on 09/14/14 and initial approval was granted on 11/7/14. The project, "Water of Wheels", a mobile educational trailer, was revised in scope and resubmitted to TDEC on August 31, 2016 to request an extension and the Division graciously consented to allow the District additional time for completion.

Finally on 1/24/18, The Division of Water Resources received HPUD's photos and documentation of the actual costs expended by HPUD for the revised SEP via letter dated 1/26/18, confirmed that HPUD had fulfilled the requirements as set forth in the Consent Order. The following photos illustrate the exhibit areas and subject matter for the expanded scope and enhanced learning objectives that the SEP will provide.

Left: Urban Water Cycle; Right: Natural Water Cycle

Left: Entrance to Exhibit Area: Right Looking out entrance

Left: Water & Wastewater Treatment; Right: Water Use in Home

Left: Water Use Calculator; Right: Wastewater Treatment Process

Left: Connecting the Process; Right: Water Quality Laboratory

SECTION 4.0 - EDUCATION AND OUTREACH ACTIVITIES

A. Utility Tours - HPUD Water Treatment Plants

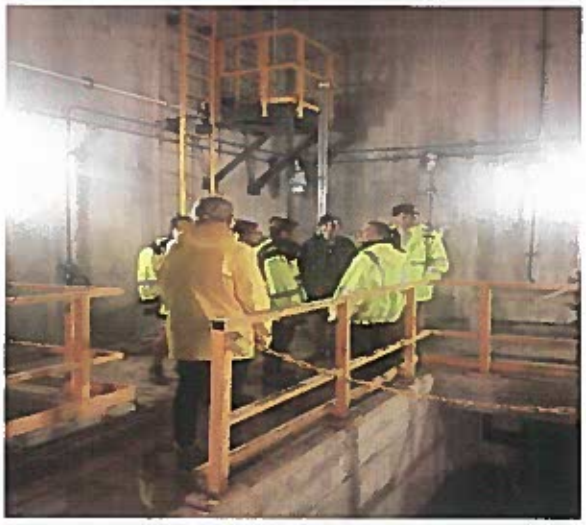
HPUD's Melton Hill Water Treatment Plant, originally built in 1962, has undergone a series of extensive upgrade projects during the past decade and is one of the State's largest and most advanced membrane filtration plants. Since the water cycle and water treatment fit into the curriculum of both middle and high school students, HPUD offers tours for the Melton Hill Water Treatment Plant. HPUD takes every opportunity to educate customers about the need for better infrastructure through use of the website, newspaper articles, company newsletters, and presentations at the monthly Board meetings.

Water Plant Superintendent giving students a tour of Melton Hill Water Treatment Plant

B. Utility Tours - HPUD Wastewater Treatment Plants

One of the most significant educational outreach efforts that HPUD supports is to provide tours of the Beaver Creek Wastewater Treatment Plant. The water and wastewater industry have become more technologically advanced over time, so it is vital to attract young people into careers within the industry.

Some of the various groups that have toured the facility within the past few years are Halls High School students, AmeriCorps students, West High School students, Grace Christian Academy students, Halls Business & Professional Association student interns, and other community groups.



AmeriCorps Students a tour of BCWWTP in September 2017

C. Halls Outdoor Classroom Sponsor

The Halls Outdoor Classroom (HOC) is a community partnership project which HPUD has provided financial support and in-kind service to make the site adjacent to Halls High School an educational resource for the community.

Left photo: HPUD serving food at HOC. Right photo: Darren Cardwell accepting plaque.

Each year the AmeriCorps students, community partners, teachers, and students participate in an annual celebration at the Halls Outdoor Classroom. HPUD's initial contribution to the site was obtaining building materials, constructing the footbridge and fence, adding water service, and providing food and drinks for the annual HOC

Celebration. HPUD continues to provide ongoing support and food for the annual activity. 2017 was the ten-year anniversary of the Halls Outdoor Classroom event.

D. Brickey MCloud Elementary School Duck Race

Another fun community event that Hallsdale-Powell Utility District assists with every fall is the "Rubber Duck Race" at Brickey McCloud Elementary School. All students in each of the grade levels race rubber ducks down a hill to win a prize provided by the school. HPUD's Education/Outreach Team makes annual preparations for the event and provides the water for the duck race from the Emory Road Water Booster Station. This year's event was held on October 6, 2017.

HPUD employees helping Brickey students with the 2017 Duck Race

E. Citizens' Academy

Since 2014, HPUD has hosted a series of meetings called the Citizens' Academy. It consists of a small group of customers representing various segments of the District's customer base such as small business, local government, medical fields and banking. The HPUD Citizen's Academy in 2017 was a series of three monthly meetings which were held on September 27, October 18, and November 1, 2017.

Photo above left shows Darren Cardwell presenting at Melton Hill WTP;
Photo at the right shows HPUD employees demonstrating use of CCTV

This series of meetings and presentations provided attendees with an overview of HPUD's water and wastewater facilities, infrastructure needs, and issues facing the utility industry. The first meeting was held at the Operations Building on Cunningham Road and consisted of a series of hands-on exhibits, presentations, videos, and storyboards. Tours were conducted of the Beaver Creek Wastewater Treatment Plant and the Melton Hill Water Treatment Plant at the second and third meetings.

F. Water on Wheels Program (WOW) for District Elementary Schools

In 2004, HPUD developed the "Water on Wheels" Program to educate area elementary schools about the importance of water quality and the impact it has on everyday life. During the past year, HPUD presented the program to about 400 students within the

HPUD service area. This hands-on activity is focused on educating students about the basic components of the water treatment process.

Beginning with a discussion about where our drinking water comes from, the students have an opportunity to learn about the potential contaminants that may be found in water sources and how they might get there. Students learn concepts about "source water protection" and taking personal responsibility for water conservation and preserving water quality.

3rd Grade students making water filters for HPUD's Water on Wheels Program

G. Knoxville Area Medication Collection Program

The Knox-Area Medication Collection Program started in 2008 to keep unwanted medications and over-the-counter drugs off the streets and out of the hands of children.

2017 Drug Collection Event at Ingles in Powell

Due to an interest in protecting the community's water source, HPUD joined the program in fall of 2009. Since the program began, partners have collected approximately 7,000 lbs. of unwanted medication through these organized collection events and the installation of a permanent drop box at the Knoxville Police Department's downtown station. HPUD has been a co-sponsor of several Knox County collection events. In October 2017, HPUD included a statement on its bills advertising a medication collection event in the District on October 7, 2017.

H. Other Education/Outreach with Local Schools

In addition to the Water on Wheels Program and other educational programs, HPUD has provided in-kind services and equipment such as donating of colorimetric water quality test kits to AmeriCorps workers. The AmeriCorps students used the test kits in their work with elementary school students through the local "Adopt a Watershed" Program. HPUD continues to provide support for educational programs in the local schools within the District. HPUD sponsored a poster contest for students at Adrian Burnett Elementary School. The lesson coincided with the 2017 Value of Water Campaign, "A Day Without Water". The instruction was based on a Project Wet lesson and the poster contest supported the theme.

2017 Winners of Poster Contest - Drinking Water Week

I. Water Fest - Community Water Education for Grades K-4

WaterFest is an annual educational event held at IJams Nature Center in the Spring of each year and is open to Grades K-4 in the Greater Knoxville area School District. Activities promote water resource stewardship and integrate the arts with the sciences. Groups participating in the event include Knox County Stormwater, University of TN Water Resources Research Center, Knox County Soil and Water Conservation District, AmeriCorps, KUB and HPUD. Each year, HPUD sets up a booth and/or sponsors an educational activity to support this this effort.

HPUD Snow Cone Booth at WaterFest May 20, 2017

J. Professional Memberships

In addition to these activities, HPUD participates in the following local organizations:

- Beaver Creek Watershed Education Committee
- Beaver Creek Watershed Outdoor Classrooms (Halls High and Brickey-McCloud Elementary Schools)
- Water Quality Forum
- Halls and Powell Business and Professional Associations
- Knox County and Union County Emergency Planning Committees

SECTION 5.0 - CHANGES TO CMOM AND CAPACITY ASSURANCE PROGRAM

A. Engineering Support and Management

The District relies on engineering support and management and good sound financial management to fund sewer system improvements over the next ten (10) years. HPUD relies on support from various consultants to assist in the implementation of a comprehensive System Capacity Assurance Program (CAP). The CAP established short and long-term actions to address hydraulic deficiencies including prioritization, alternative analysis, and a schedule for completion of these steps.

The District utilizes several consultants to assist HPUD with implementing the components of the 2006 Wastewater Master Plan, as well as the long term Corrective Action Plan (CAP) for improvements to the collection system. HPUD will continue the Preventative Maintenance and Inspection (PMI) Program and develop a list of priority repairs to the collection system. This work is essential in assisting HPUD manage assets and the collection system. It also helps with selecting optimum sites for installing equalization basins for wet weather storage during rain events.

B. Financial Management

HPUD continues to develop a solid capital improvement and financial plan to fund the improvements required as a result of this Consent Order. The Budget for Fiscal Year 2019 (April 1,2018 - March 31, 2019) was presented for consideration at the March Board Meeting which was held on March 22, 2018. Discussion at the March Board meeting also focused on the revised water and sewer rate schedule for FY 2018. The Board of Commissioners approved the revised rates and adopted the revised rate schedule, which incorporates a three (3%) percent increase in water rates and a six percent (6%) increase in sewer rates. These rates will become effective on September 1, 2018.

HPUD remains committed to ensuring rates support the Capital Improvement Projects outlined in our Capital Improvements Plan (CIP) through FY 2025. To ensure our customers understand the importance of these rate changes, there is a continued communication effort by the District using the HPUD website, newsletters, mailers and pamphlets and newspaper article.

SECTION 6.0 - OVERVIEW OF FIVE YEAR CAPITAL IMPROVEMENTS PLAN

Most of the one-year and five-year capital improvements projects have been described in different sections of the Annual report. A summary of the one-year and five-year CIP is included in the Appendices. The strategy of formulating a Capital Improvements Plan for at least a five year period requires continuing data analysis, prioritization of system defects, and possible revision of implementation schedules from year to year.

Several projects have been prioritized and placed into the five year CIP as grant funding, SRF loans, and revenue bonds are available for financing the projects. ***(Refer to Attachment 2-Sewer System CIP).***

Some the key projects planned for FY 2018 and FY 2019 are listed below:

Planned Projects for FY 2018 and FY 2019

1. Beaver Creek Interceptor Replacement Phase 1
2. Wastewater Pump Station Improvements
3. Continued Sanitary Sewer Rehabilitation

SECTION 7.0 - SUMMARY OF CMOM PROGRAM IMPLEMENTATION

Although infrastructure improvements to the Beaver Creek Wastewater Treatment Plant have been a priority in past years, the the evaluation and prioritization areas of the sewer collection system for rehab and replacement have taken precedence. The ongoing Preventive Maintenance and Inspection (PMI) Program enables the District to achieve the changes necessary to ensure adequate capacity in the collection system, and to reduce and eliminate sanitary sewer overflows. Improvements and enhancement of the District's Geographic Information System (GIS) allows HPUD to geographically track customer complaints, work orders, collection system problems, manage collection system assets, and analyze system issues.

Combined with information from the long term flow monitoring program, the data in the GIS provided HPUD with an indication of which sanitary sewer basins required further investigation and the likelihood of which sanitary sewer pipelines and/or manholes required rehabilitation. Each year we have further refined our database and found it to be invaluable as a tool for managing data for the CMOM program.

Throughout 2017, the District continued to improve asset management processes and data quality and accuracy. Over time, the Cityworks Work Order Management System has become more compatible with the District's overall asset management program. The implementation of PIMS helps HPUD to obtain more accurate construction costs for assets. Hopefully, this will improve our ability to perform life cycle cost analysis and also provide an accurate database of cost information to use for future estimating. In coordination with the software improvements.

In evaluating the effectiveness of HPUD's CMOM Program development and implementation over the past few years, several key factors have been noted. The efficient operation and management of HPUD's collection system assets is essential as well as the ability to continuously monitor collection system performance. Our main focus continues to be:

- Maintaining a comprehensive system inventory and information management system.
- Implementing an effective sewer overflow response program including better emergency response and reporting procedures.
- Performing timely and adequate collection system operation and maintenance.
- Conducting effective system hydraulic capacity assessment, evaluation, and assurance.

- Implementing and maintaining an effective public communication and outreach program

HALLSDALE- POWELL UTILITY DISTRICT - PERFORMANCE SPREADSHEET						
Program/Performance Measures	2012	2013	2014	2015	2016	2017
Infrastructure From GIS						
# Gravity Lines (feet)	2,306,389	2,247,880	2,272,871	2,272,871	2,284,611	2,290,422
# Forcemain (feet)	220,549	209,296	211,105	211,105	212,523	213,961
# Connections	22,254	22,430	22,606	22,781	22,992	9,555
Sanitary Sewer System Overflow Response						
# Overflows	110	193	95	97	101	84
# Estimated Gallons of Overflows	464,600	1,037,800	356,500	799,500	898,300	245,700
# Overflows Reaching Waters	94	178	79	87	93	74
# Estimated Gallons of Overflows Reaching Waters	391,000	765,300	147,000	734,000	500,100	106,500
95	0 BCWWTP 0 RVWWTP	0 BCWWTP 1 RVWWTP	0 BCWWTP 0 RVWWTP	0 BCWWTP 0 RVWWTP	0 BCWWTP 0 RVWWTP	0 BCWWTP 0 RVWWTP
# Dry Weather Overflows	19	19	23	21	12	14
# Wet Weather Overflow Events per NPDES Permit Language						
# Wet Weather Overflow Individual Releases	91	174	72	76	89	70
# Overflows Cleaned Up	90	174	75	64	73	68
# Overflows Reported on Electronic DMR						
# Overflows Initial Report Notification to TDEC	110	193	95	97	101	84
# Overflows Follow-up Report Sent to TDEC within 5 Days	110	193	95	97	101	84
# Building Backups Due to Public System Failure during Dry Weather	16	4	20	22	12	16
# Building Backups Due to Public System Failure during Wet Weather	0	1	0	1	2	0
Customer Complaint Tracking						
# Complaints Received	139	210	250	306	252	283
# Complaints Investigated	139	210	250	306	251	280
# Complaints Resolved	125	202	241	294	235	267
# Complaints determined to be Customer Private Line Issues	36	51	88	58	53	65
Assessment and Prioritization - Corrosion						
# Locations Subject to Corrosion	None Identified To Date	None Identified To Date	None Identified To Date	None Identified To Date	None Identified to Date	None Identified to Date
# Corrosion Inspections Conducted	N/A	N/A	N/A	N/A	N/A	N/A
# Corrosion Defects Identified	N/A	N/A	N/A	N/A	N/A	N/A
Manhole Inspection/ROW						
# Manholes in System	9,559	9,457	9,505	9,517	9,528	9,555
# Manholes Inspected during the Calendar Year	808	1,958	236	11	1,211	664
# Manholes Inspected since Program Began	5,691	6,471	7,885	7,896	9,107	9,771
# Manholes with Defects	582	(2)	160	10	388	270
Flow Measurement (ADS)						
Year of Most Recent Flow Monitoring	2012	2013	2014	2015	2016	2017
Peak Flow Observed During Monitoring Period(gpd)	17,640,000	22,490,000	16,190,000	19,120,000	18,270,000	21,960,000
Instantaneous Peak Flow Observed(gpd)		24,824,000	18,983,000	21,198,000	20,150,000	23,750,000
Average Flow Observed during Monitoring Period(gpd)	7,547,000	7,654,000	6,534,000	6,868,000	6,129,000	7,032,321
Low Flow Observed during Monitoring Period(gpd)	4,630,000	4,101,000	4,003,000	3,902,000	3,693,000	4,340,000
List Basins that Contribute Flow to this Basin	See System Map	See System Map	See System Map	See System Map	See System Map	See System Map
CCTV Inspection (Contractor & Internal)						
# Feet Inspected by CCTV this Calendar Year	252,622	348,108	148,549	117,880	319,630	252,404
# Feet Inspected since Program Began	1,476,231	1,445,453	1,972,888	2,090,768	2,410,398	2,662,802
# Feet Cleaned for Inspection	42,724	272,450	28,580	8,300	190,290	108,901.8
# Feet Cleaned for Routine or Scheduled Maintenance	54,153	32,015	68,328	60,424	57,713	56,455
# Defects Identified by CCTV Inspection	289	(2)	3,531	177	2,242	2,090
# Defects Catalogued or Recorded into Database	289	(2)	3,531	177	2,242	2,090

HALLSDALE- POWELL UTILITY DISTRICT - PERFORMANCE SPREADSHEET

Program/Performance Measures	2012	2013	2014	2015	2016	2017
Smoke Testing (Contractor & Internal)						
# Feet Smoke Tested this Year	237,021	394,198	32,657	0	275,814	0
# Leaks Identified on Public System	275	198	18	0	229	0
# Public System Leaks Repaired	148	0	9	0	0	0
# Public System Leaks Not Repaired This Year	127	198	9	0	229	0
# Leaks Identified on Private Service Connections	219	31	19	0	90	0
Gravity Line Rehabilitation (Contractor & Internal)						
# Feet Gravity Lines Rehabilitated	11,075	0	3,455	33418	0	12,292
# Feet Rehabilitated Since Program Began	191,297	191,297	194,752	228,170	228,170	240,462
# Feet Replaced	0	0	3,455	5497.5	0	0
# Feet Replaced Since Program Began	16,868	16,868	20,323	25,821	25,821	25,821
# Feet Sliplined	0	0	0	0	0	0
# Feet Sliplined Since Program Began	0	0	0	0	0	0
# Feet Cured in Place	10,295	0	0	27920	0	12,292
# Feet Cured in Place Since Program Began	181,089	181,089	181,089	209,009	209,009	221,301
# Manholes Rehabilitated	181	0	13	409	20	96
# Manholes Rehabilitated Since Program Began	1,499	1,090	1,103	1,512	1,532	1,628
# Manholes Replaced	0	0	20	19	0	4
# Manholes Replaced Since Program Began	70	70	90	109	109	113
# Feet of Gravity Line Rehabilitation Inspected	11,075	0	3,455	33,418	0	12,292
# Feet Of Gravity Line Rehabilitation Tested	0	0	3,455	5497.5	0	0
Grease Program						
# Facilities Identified for Inclusion in Grease Program	160	144	145	146	149	157
# Facilities with Installed Grease Devices	160	144	145	146	149	157
# Grease Installation Inspections Conducted and Documented	2		2	3	11	4
# Routine Grease Inspections	358	439	468	483	499	502
Other Inspections						
# Construction Inspections	8	6	6	8	9	5
# Pump Station Inspections	209	298	318	354	625	401
# Documented Pump Station Inspections	209	298	318	354	625	401
# Customer Owned Service Line (lateral) inspections	185	181	175	208	163	203
[1] Note this number may not be quantifiable in wet weather						
[2] Final data numbers were not available as of the date this report was prepared						

Sewer Capital Improvements	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Total
Sewer Rehab Basin 1F/1G & other		2,500,000							$ 2,500,000
Sewer Rehab Basin 9B & other			3,000,000						3,000,000
Sewer Rehab Phase 4	5,000,000								5,000,000
Sewer Rehab Phase 5		5,000,000							5,000,000
Sewer Rehab Phase 6			5,000,000						5,000,000
Sewer Rehab Phase 7				5,000,000					5,000,000
Sewer Rehab Phase 8					5,000,000				5,000,000
Sewer Rehab Phase 9						5,000,000			5,000,000
Sewer Rehab Phase 10							5,000,000		5,000,000
Beaver Creek Interceptor Replacement Phase 1 SRF Loan	12,000,000								12,000,000
Beaver Creek Interceptor Replacement Phase 2 RUS Loan		5,000,000	5,000,000						10,000,000
North Fork Interceptor Imp. Phase 2		600,000							600,000
West Emory Rd Sewer Realignment	700,000								700,000
Sharps Chapel Sewer System	100,000	100,000							200,000
Beaver Creek Interceptor from Central Ave to I-75 SRF loan	4,800,000								4,800,000
Beaver Creek WWTP Upgrades to future solids				5,000,000					5,000,000
Beaver Creek WWTP Clarifer Drive Replacements		2,300,000							2,300,000
Beaver Creek WWTP Upgrading to handle more Flow					7,000,000				7,000,000
Replace Step Systems w/ Grinder Pumps	10,000	10,000							20,000
Miscellaneous Sewer Line Extensions	100,000	100,000	100,000	100,000	200,000	200,000	300,000		1,100,000
Wastewater Pump Station Improvements	200,000	250,000	200,000						650,000
Beaver Creek WWTP Membrane Replacement						1,875,000			1,875,000
Sewer Equalization Storage Norris Freeway				9,000,000					9,000,000
Sewer Equalization Storage near I-75						11,000,000			11,000,000
Sewer Investigation	500,000	500,000	500,000	500,000	500,000	500,000	500,000		3,500,000
									-
									-
Total Sewer Capital Improvements	**$ 23,410,000**	**$ 16,360,000**	**$ 13,800,000**	**$ 19,600,000**	**$ 12,700,000**	**$ 18,575,000**	**$ 5,800,000**	**$ -**	**$ 110,245,000**

Dry Weather SSOs
14

Wet Weather SSOs
70

2017 Sanitary Sewer Overflows (SSO)

SSO (Total 84)

Weather Conditions

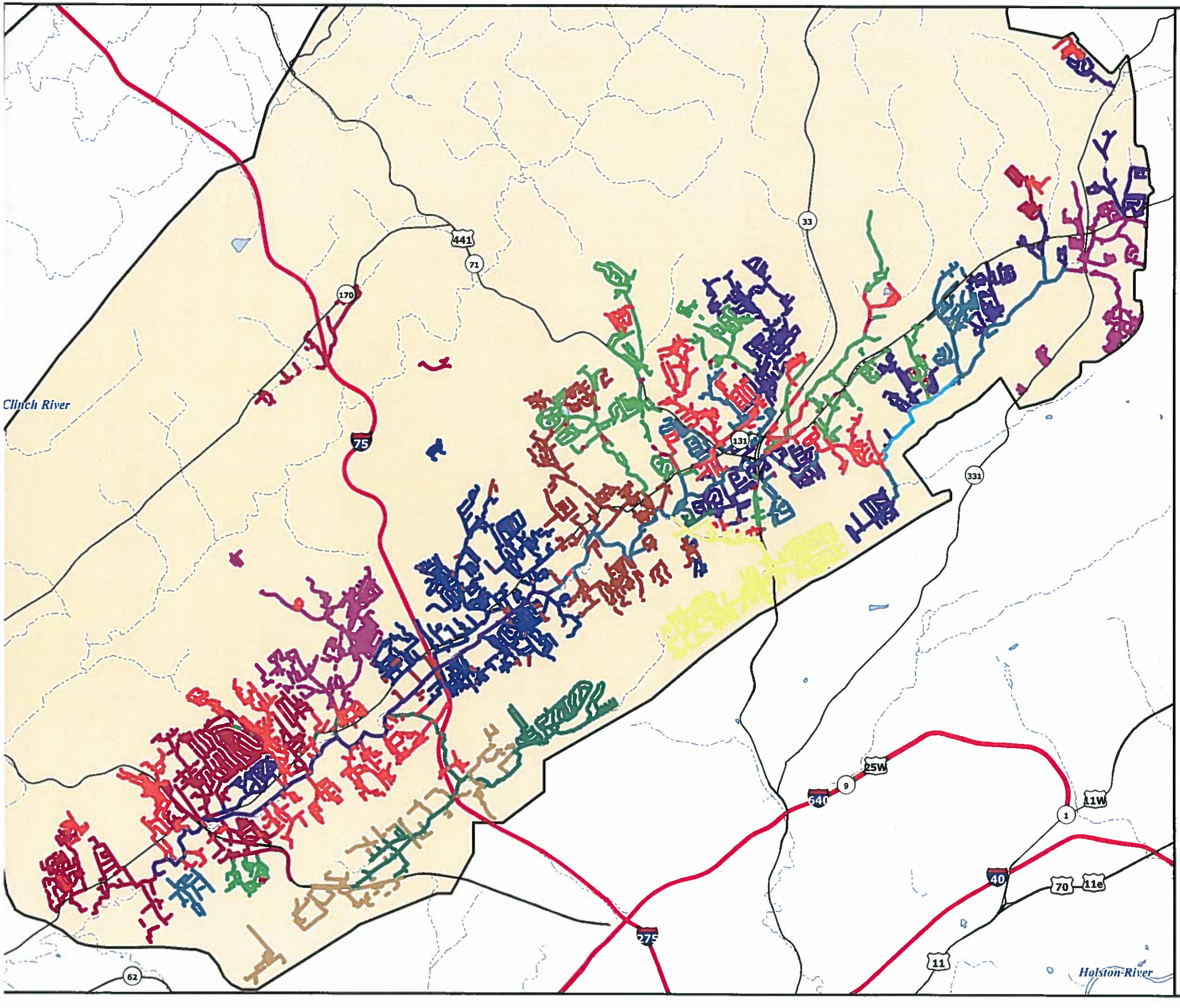
- Dry (14)
- Wet (70)

Base Map

- HPUD Service Area
- FEMA Flood Zone
- FEMA 100yr Flood Zone
- Interstate
- State Highway; U.S. Highway
- Regional Streams
- Regional Water Bodies

0 0.75 1.5 3 Miles

Knoxville



HALLSDALE-POWELL UTILITY DISTRICT

Annual PMI Inspections

Legend

HPUD Service Area

CCTV Inspections by Year

YEAR

- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017

N

0 0.75 1.5 3 Miles

2017 PMI CCTV Inspections

HALLSDALE-POWELL UTILITY DISTRICT

Legend

HPUD Service Area

Collector

Interceptor

CCTV

2017

N

0 0.125 0.25 0.5 Miles

HALLSDALE-POWELL UTILITY DISTRICT

HP01
HP02
HP03
HP04
HP05
HP06
HP07
HP08
HP09

170
131
75
33
71
441
331
275

N

0 0.5 1 2 Miles

Legend

- HPUD Service Area
- Collector, HPUD
- Interceptor, HPUD

Long-Term Flow Monitors

- Permanent Flow Meter
- Rain Gauge

HALLSDALE-POWELL UTILITY DISTRICT

PHASE 4 REHAB

INDEX

Legend

- ManholeRehabilitation
- Point Repairs

Cured In Place Pipe

- Liner thickness: 4.5mm
- Liner thickness: 6mm
- Liner thickness: 7.5mm
- Liner thickness: 9mm
- Liner thickness: 10.5mm
- PipeBurst

Subtype, AdministrativeArea, Enabled

- HPUD Collector
- Inline Storage, Hallsdale-Powell Utility District, True
- Interceptor, Hallsdale-Powell Utility District, True
- Private Collector
- Abandoned Lines

[Disclaimers, data sources, references, etc]

N

1:250
Feet

NAD 1983 HARN StatePlane Tennessee FIPS 4100 Feet

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