CORRECTIVE ACTION PLAN

FOR

SANITARY SEWER OVERFLOWS

OCCURRING

IN THE

WEST END DRAINAGE AREA

COOKEVILLE, TENNESSEE

MARCH 2017

BY:

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I. PURPOSE AND SCOPE

The primary objective of this report is to convey the actions that the City of Cookeville has taken and will take in the West End Drainage Basin to reduce overflows or the potential of overflows. Any part of the collection system that has overflows receives considerable attention as we strive to eliminate all overflows. This is in part because of:

1) the City's desire to eliminate overflows in the collection system,
2) the need for everyone to protect the environment,
3) the potential for someone to come into contact with raw sewage, and
4) Cookeville's National Pollutant Discharge Elimination System. (NPDES) Permit (Permit Number TN 0024198) states that "No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflow (greater than 5 events per year) or would otherwise overload any portion of the system unless….."

The West End Drainage Basin, as shown on Figure 1, does not have "chronic overflows" and is receiving due attention, but this report is being developed in part to meet the requirements of the Consent Decree between the Tennessee Department of Environment and Conservation and the City of Cookeville. The Eagles Landing Basin pumps into the West End Basin.

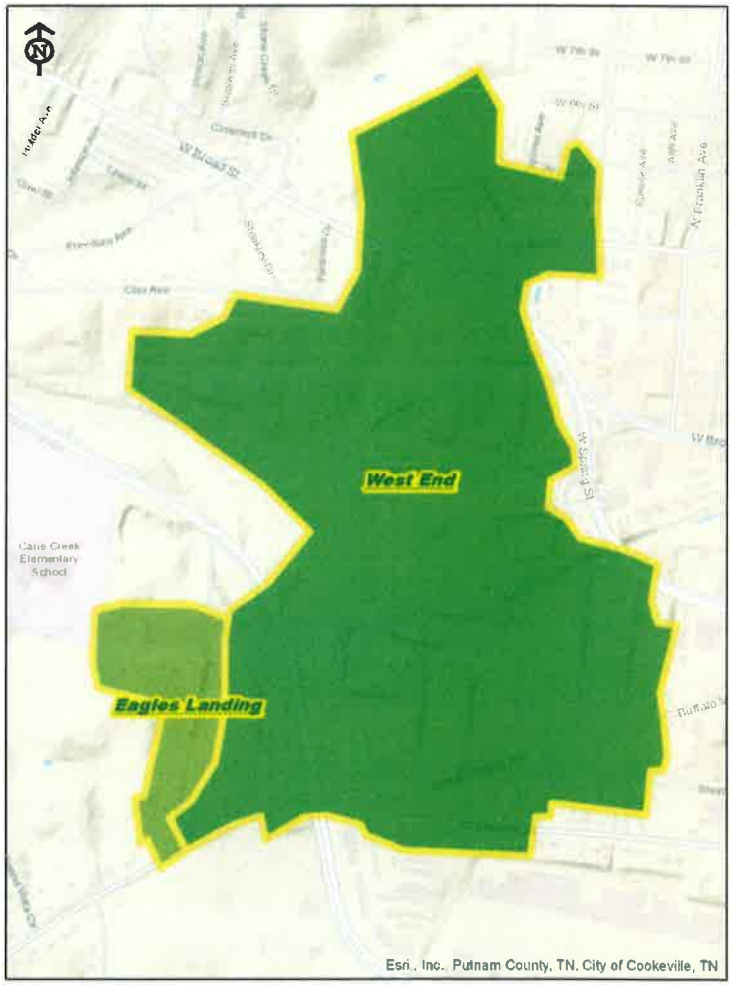

Figure 1, West End Drainage Basin

II. GENERAL INFORMATION

A. Background

Originally, in this area there was what was called the Handle Mill Pump Station, a 200 gallon per minute (gpm) pump station, located approximately 1,000 feet southeast of the present West End Pump Station. The Handle Mill Pump Station and the 17,532 feet of sewer that drains to it was installed in 1964. All of this sewer was 8" concrete pipe. In 1972 another pump station, the Valley Trailer Park pump station was built which pumped into the Handle Mill drainage basin.

Around 1976 approximately 4,048 feet of sewer was added to this basin. At that same time the West End Pump Station, a 350 gpm pump station, along with approximately 8,114 feet of sewer was built. It appears that all of this sewer was clay pipe. In 1980, 415' of 8" PVC was added to pick up 5 lots.

In 1992, an interceptor sewer consisting of 1,076' of 10" PVC was installed which eliminated the Handle Mill pump station, combining both basins into the West End drainage basin. Figure 2 shows the three sub basins that make up the flow to the West End Pump Station. In 1997, a new force main for the West End pump station was built rerouting the flow into the new 12" Cane Creek pump station force main which was located in Jackson Street.

In 2005, a developer removed all of the trailers in the Valley Trailer park, built

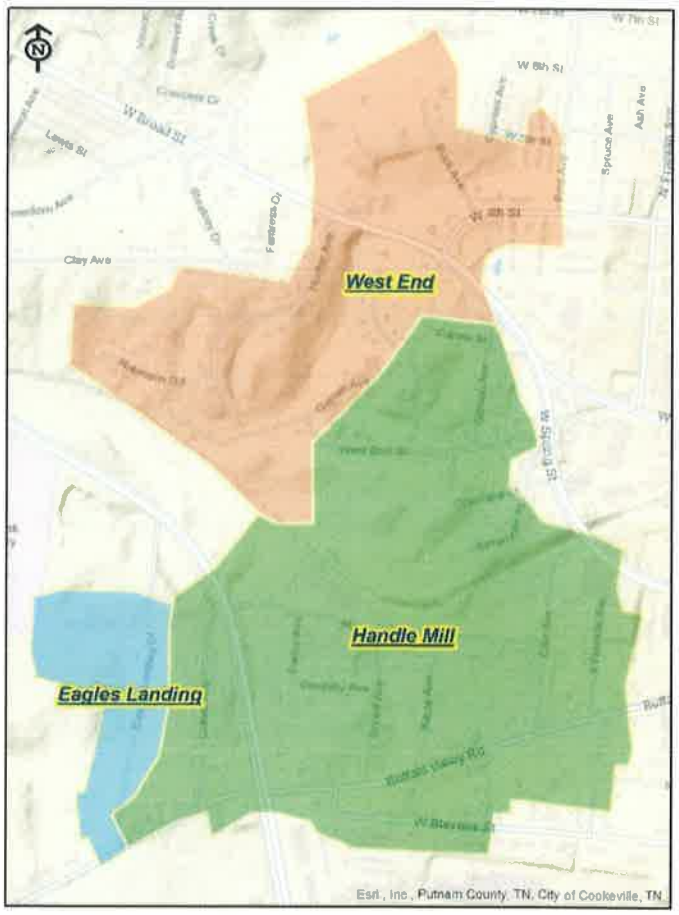

Figure 2, Sub-basins of West End Drainage Basin

the Eagles Landing Apartment Complex, and replaced all of the gravity sewer lines with new 8" PVC pipe. The Valley Trailer Park pump station was renamed to Eagles Landing pump station. The basin then remain unchanged until 2016, when 145' of 8" PVC sewer was added for a 4 lot Habitat for Humanity subdivision.

There is very little remaining undeveloped property within this drainage basin. This is evidenced by the fact that the only 560' of sewer has been added to the basin since the West End pump station was constructed in 1976.

The chart below indicates the sewer make up of this basin.

Year	Footage*	Pipe Material	Comments
1964	17,532'	8" Concrete	Old Handle Mill PS
1976	4048'	8" Clay	Addition to Handle Mill Basin
1976	8,114'	8" Clay	West End Pump Station Built
1980	417'	8" PVC	Added 5 lots
1993	1,076'	10" PVC	Combined Handle Mill & West End
2016	145'	8" PVC	4 lot addition
Total	**31,332'**		

*The 1,502' of 8" PVC serving the Eagles Landing PS is not shown in this chart

As stated above, the Eagle's Landing pump station, a 200-gpm pump station, pumps over to the West End Drainage Basin. The Eagles Landing Basin serves apartments and only has 1,502 feet of 8" PVC sewer. The 200-gpm station is a Smith Loveless station that was moved there to replace the original deteriorated 100 gpm pump station. This station does not have to be 200 gpm, and could be throttled to reduce the load on the West End Pump Station if needed. The force main could also be rerouted and higher head pumps used to remove it from the West End Basin completely. If rerouted a new force main would be installed to the manhole that the Cane Creek force main discharges into. Not only would this reduce the load on the West End pump station, it would also eliminate having to pump the sewage from the Eagles Landing pump station

twice, but the cost to benefit does not warrant this happening any time soon. This would be looked at when there is a need to replace the Eagles Landing pump station.

B. Overflow History

Any wet weather overflows in this drainage basin occur at the manhole at the pump station. The table below reflects the yearly overflows at this pump station for the last 5 years.

Overflows at the West End Pump Station					
Cause	**2012**	**2013**	**2014**	**2015**	**2016**
Wet Weather	1	1	1	3	2
Dry Weather			2		1

Of the three dry weather overflows, two were the result of power outages. One of those (11-6-14) the power came back on just as the station started to overflow and the estimated overflow was 20 gallons. During the other power outage, a generator was taken to the station and hooked up and ran, but it was during a storm event (2.68") and it was estimated to have overflowed approximately 650 gallons before the generator could be placed in service. The third dry weather overflow event was when the UPS for the controller failed and kept the controller from working. Another float and circuit was added, which should prevent from happening again.

In addition to the overflows mentioned above, all of which occurred at the pump station, there were a total of 5 dry weather overflows that happened within the basin at different locations, as shown on Figure 3. Two (MH 2329 on 5/16/14, and MH 2268 on 6/24/15)

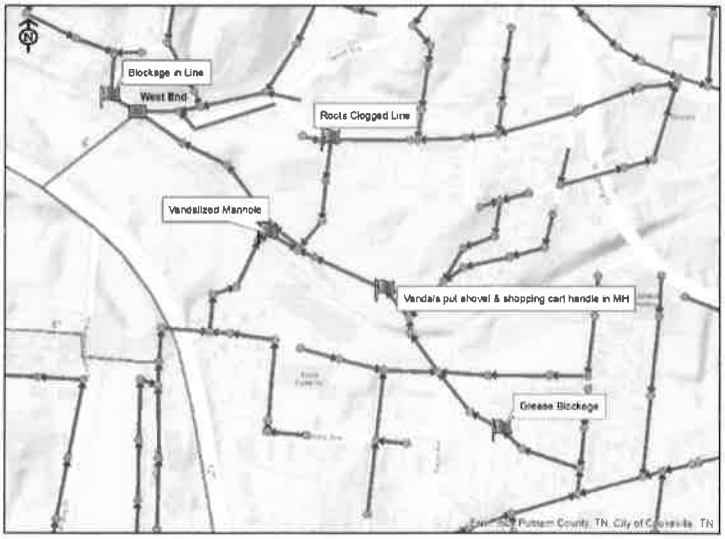

Figure 3, Overflows upstream of the pump station

were due to vandals placing objects in the manholes such as shopping cart handles or a shovel. One, MH 2466 on 1/9/13, was due to grease in the line. One, MH 2197 on 9/18/12, was due to roots in the manhole – that manhole was cleaned out and was epoxy coated. The last one, MH 2144 on 10-13-16, was due to a blockage. This amounted to one per year up in the basin.

C. Drainage Area Attributes

The City of Cookeville has very good base maps of all of their sewer lines and are using an Arc View based GIS system. Querying the information in this mapping and database system it is easy to visually show the layout of the basin and sub basins, as well as the pipe material. Figure 4 shows the extent of the drainage basin with the concrete pipe shown in red, the clay in black, and the PVC in green. There are 165 manholes in the basin, including the 6 in the Eagles Landing sub basin.

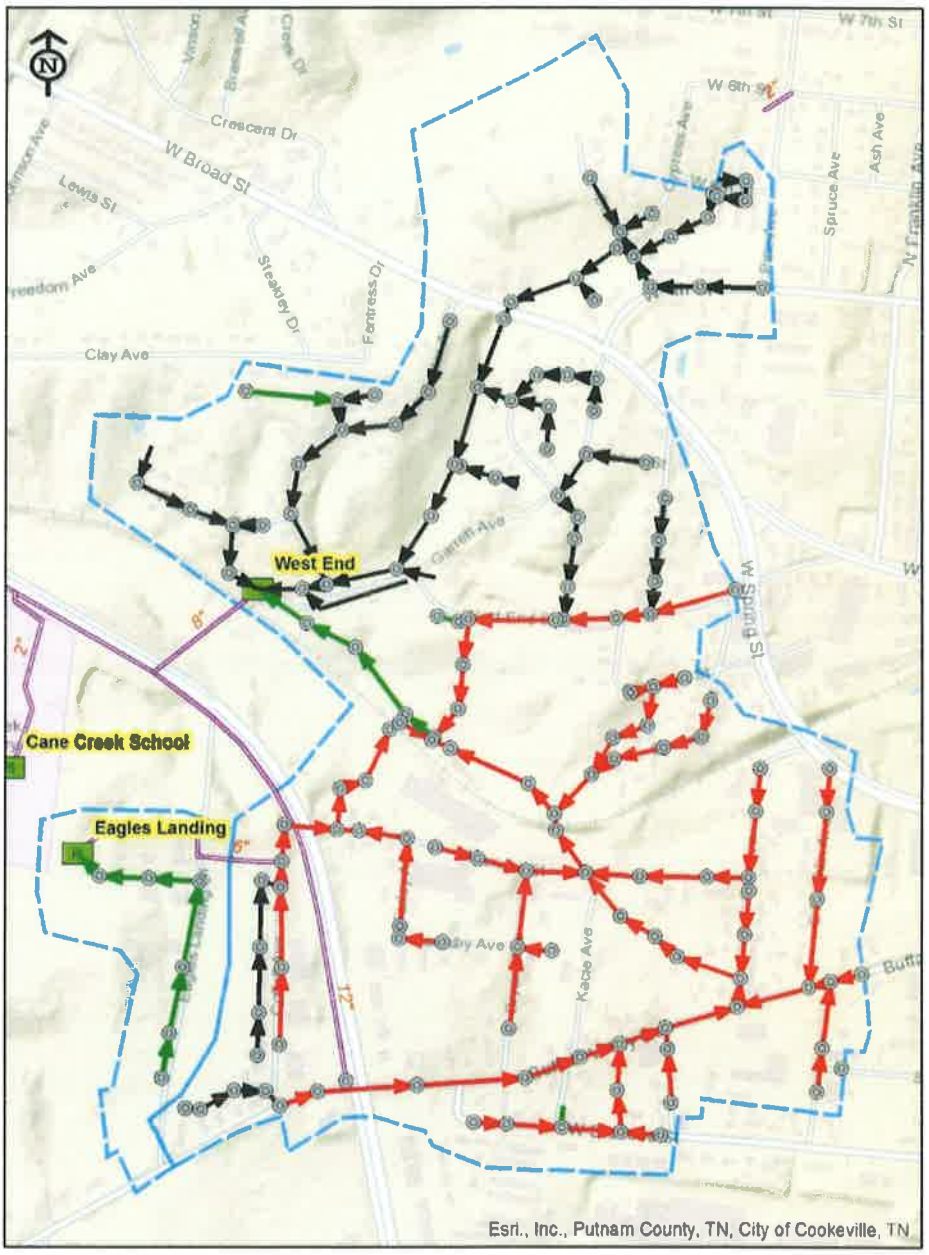

Figure 4, Pipe Material: Red= Concrete, Black = Clay, Green = PVC

D. Smoke Testing

In 2013 we smoke tested the entire basin (excluding the Eagle Landing sewers) and identified 74 problems. Most of the problems found were damaged clean-outs. We addressed all of the problems that were our responsibility and notified the homeowner of the private problems. There remains 16 problems that there is no documentation as to whether the problem was corrected. Smoke testing adds smoke in the manholes to find leaks along the collection lines and around the manholes. The manholes accessed during the smoke testing were inspected for defects and leaks, however, the smoke testing did take place during the dryer months.

The pictures of the defects that do not have documentation of the repair need to be studied and field visits made to see if a determination can be made as to whether a repair is needed.

III. PREVIOUS REHABILITATION WORK

In 1994, there was a total of 434' of sewer in this basin that was lined using cured-in-place pipe (CIPP). In a 2015 rehabilitation project, an additional 2,499' of sewer in this basin had CIPP installed. In the latter project, there were very few laterals, but they all were replaced, whereas in the first project they were not. These sections are shown in Figure 5. The cost for these projects was approximately $89,000.

Figure 5, Lines with CIPP installed

In 2012, the manhole that had problems, as previously mentioned, was lined with an epoxy coating. In 2014, there were three manholes identified with leaks, and they were also lined with epoxy. The cost to rehab these four manholes was approximately $8,000.

IV. PROPOSED IMPROVEMENTS AND ESTIMATED COST

We have conducted drawdown tests to check to see if the pumps were pumping at the rated capacity. In 2014 they were, in 2015 they were not quite, and then in 2016, they were pumping at about 80% capacity. The worst performing pump was replaced earlier this year and a drawdown test has not yet been performed. This test will be done with our personnel by June 30, 2017, and the cost is insignificant. If the older pump is the only one deficient, it will be rebuilt or replaced by December 31, 2017. If neither are pumping the design flows, the system will have to be studied since one of the pumps is new. In future drawdowns it needs to be documented whether the Cane Creek pump station is running or not since the West End pump station pumps into the 12" force main serving the Cane Creek pump station, as this would affect the system curve.

As stated earlier, there are 16 smoke testing defects that do not have documentation as to whether they were fixed or not. The smoke testing information will be reviewed to make a determination as to whether they were repaired. It will be easy to make a determination on the ones that the pictures show a broken clean-out or a missing clean-out cap, but there will be some that will have to wait to our next smoke testing. The evaluation of the smoke testing defects shall be made by September 30, 2017. Those found to still need repair will have a letter sent to the owner by December 31, 2017. Some follow-up may be necessary, but the only deadline in this report is the notification letter.

In the 2017 rehabilitation project, which has already been bid, 2,596 feet of line will have CIPP installed. In addition we will be replacing the laterals in those sections. The sections that will

have CIPP installed are shown in Figure 6. The bid price for the lining is $42.00 per foot and the price per lateral is $2,800 with a clean-out and patching, for a total cost of about $165,000. The actual number of laterals will not be determined until the contractor completes the CCTV work. This project will be complete by February 28, 2018.

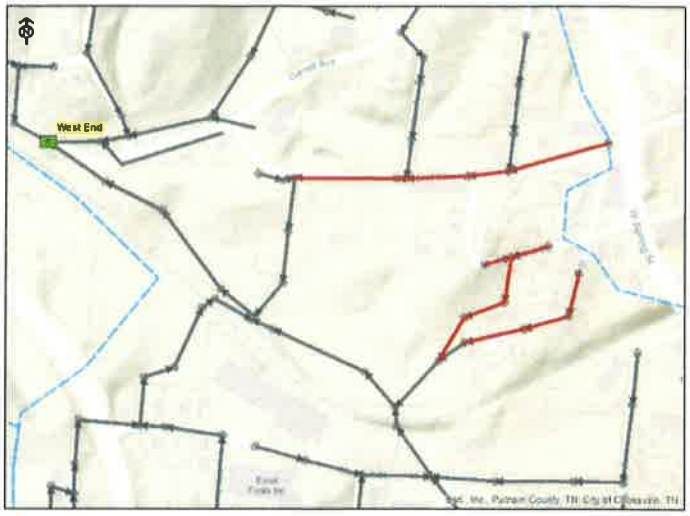

Figure 6, CIPP installation for 2017

The 434' of sewer that had CIPP installed in 1994, did not have the laterals replaced. Since that time, we have learned that the laterals should be addressed at the same time as the main line. Therefore we will look back at the video of these two sections, identify the location of the laterals and add the laterals to a rehabilitation project. It is estimated that there will be four laterals. The work will completed by July 31, 2018. Estimating $2,500 per lateral, the total cost would be $10,000.

All of the sections in this basin that we have televised have been concrete pipe. Also, all of the sections that we have installed CIPP in, and the ones we are installing CIPP in this year are concrete. To better assess the condition of the drainage basin, some of the clay pipe needs to be televised. The section west of the pump station and at least four of the sections northeast of the pump station toward Highway 70 will be televised. The section west of the station was chosen because the first 40' is shown as ductile iron; the transition to clay pipe should be looked at to see how it was made, and to see if it is still water-tight. Also this section did have a dry weather blockage. In addition, the two sections of concrete pipe upstream of the 1994 lining need to be televised. These lines will be used as indicators of the condition of other sections. By December 31, 2018, the seven

sections mentioned will be televised. These sections are shown on Figure 7. This will be approximately 1,650 linear feet at approximately $2.50 per foot, for a total cost of $3,600.

Figure 7, Lines to CCTV

Most of the manholes in the basin have been inspected, and very few leaks have been found. After CIPP is installed, leaks that were previously entering the pipe tend to migrate to the adjacent manholes. After the 2017 rehabilitation project is complete, the 33 manholes that have CIPP entering them should be inspected during a period of high ground water. These manholes will be inspected by December 31, 2018. Using contract labor the cost per manhole is $100, for a total cost of $3,300.

With the manhole inspection and the televising work both being completed by December 31, 2018, and evaluation would have to be made of that information to determine what type, if any rehabilitation is needed. The evaluation should include looking at replacement as well as rehabilitation. Without knowing their condition, or what type of attention they may need, there is no way to speculate or estimate any type of schedule to address them now. By June 30, 2019, an evaluation of that data should be made, and a recommendation of what, if anything should be done.

This basin has not had chronic overflows and growth in this basin is limited. We anticipate that the work outlined in the report will further reduce the occurrence of overflows in the basin. By December 31, 2019, an evaluation of the progress and status of this drainage basin shall be made and an update shall be sent to the TN Division of Water Resources.

V. COMPLIANCE SCHEDULE

The dates given within Section IV are the compliance deadlines that the City of Cookeville is committing to meet. Those dates are:

1. **By June 30, 2017, conduct a pump drawdown test.**

2. **By September 30, 2017, evaluate the old smoke testing defects that do not have a repair documented.**

3. **By December 31, 2017, notify property owners of defects remaining from the old smoke test data evaluation.**

4. **By February 28, 2018, complete the CIPP lining of the 2,596' of pipe included in the 2017 rehabilitation project.**

5. **By July 31, 2018, replace the laterals on the sections that had CIPP installed in 1994.**

6. **By December 31, 2018, televise (CCTV) the section west of the pump station, at least four of the sections toward Highway 70, and the two sections upstream of the 1994 CIPP work.**

7. **By December 31, 2018, inspect the 33 manholes that have CIPP installed into them.**

8. **By June 30, 2019, evaluate the CCTV work, and the manhole inspections and determine what repairs, if any, are needed.**

9. **By December 31, 2019, evaluate the progress and status of this drainage basin and update the TN Division of Water Quality Control.**