Appendix A

Potential Methods to More Efficiently Transport Wastewater to Hammond Wood WWTP

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1. General

An analysis of the raw wastewater collection system leading to the Hammond Wood WWTP was performed to determine potential methods to more efficiently transport raw sewage to the WWTP. There are several methods to convey raw sewage through a sewer collection system. The best and most basic approach is to transport the raw sewage in a system of gravity sewers, without having to pump the sewage. The design intent is to convey the raw sewage to the sewer interceptors leading to the WWTP while minimizing cost. Time of conveyance can increase the cost of operation due to the potential for septicity of the raw sewage and the resulting potential for corrosion of pipes, manholes, pumps, controls and other exposed materials.

Pumping can be costly, due to capital cost and operation and maintenance costs required to construct and maintain a pumping station. Federal, State and local regulations require certain materials, pumping redundancy and emergency power capabilities that add to those costs. Natural and man-made obstacles or barriers to the use of gravity sewers require the use of pumping stations as an option. Even when the use of pumping stations is necessary, the best approach to minimize the cost of transporting the sewage to the WWTP is to minimize the number of times raw sewage is pumped.

Another approach to this type of analysis is to address the "sensitive" areas of the sewer collection system such as siphons and areas of sewer system overflows (SSOs). If not properly designed and maintained, siphons can create more cost in conveying raw sewage to the WWTP. The movement of the raw sewage through the siphon is critical to the effectiveness of the siphon, and lack of proper maintenance can reduce its effectiveness, creating a bottleneck to the sewage flow. Areas with SSOs are also sensitive areas of the collection system that may need relief in the form of additional facilities or regular maintenance, in order to help make them a cost-efficient transmission facility. SSOs can occur at manholes and/or pumping stations.

There are some disadvantages to this type of analysis, when it is applied to an existing system, as opposed to a collection system to be designed. The components of the existing system are already in place, whether or not they were designed and constructed in a manner to be the most cost-efficient in the conveyance of the raw sewage. Land development rarely gives raw sewage conveyance any priority, when looking at the development potential of land tracts. If a sewage pumping station can provide service to a proposed development, it is normally located and constructed without due consideration of other gravity sewer pipe options. The analysis of an existing system may result in potential corrections that are more costly than the cost of maintaining the less-efficient collection system as-is.

2. <u>Hopkinsville Sewer Collection System</u>

Until September 2012, raw sewage in Hopkinsville was treated at both the Northside WWTP and the Hammond Wood WWTP. The Northside WWTP served the sewer sub-basins in the northern third of Hopkinsville, while the Hammond Wood WWTP served the other sub-basins. The Northside WWTP was decommissioned and replaced with an 8 MGD sewage pumping station (SPS) that pumps the raw sewage approximately 5.4 miles to the North interceptor, leading to the Hammond Wood WWTP. The design and construction of new, major sewage conveyance facilities provides opportunities for consideration of options to revise adjacent, existing facilities to create a more cost-efficient collection system.

In performing this analysis, sewer service sub-basin flow schematics, sub-basin maps and a comprehensive sewer collection system map of Hopkinsville were reviewed to determine if there were any feasible means of revising any portions of the existing collection system to make it more efficient in transporting raw sewage flows to the Hammond Wood WWTP. Areas of sewer system overflows from the associated "*Sewer System Overflow Plan (SSOP)*" were cross-referenced with the maps to locate those "sensitive" portions of the collection system that may have a flow issue that could be corrected, resulting in a more flow-efficient and cost-efficient system. Strategies of areas to be further investigated, as potential means of more efficiently transporting raw sewage to the Hammond Wood WWTP, are described herein. It is recommended that a detailed engineering study and cost analysis be applied to each of these proposed strategies, to properly determine their feasibility of application.

3. <u>Inspection of All Siphons</u>

As mentioned earlier, siphons can be a hindrance to a flow-efficient system if not properly designed and maintained. Two siphons in the sewer collection system in Hopkinsville have had operational issues in the past. The first siphon is the one crossing the North Fork Little River on the south side of the Northside SPS site. This siphon consists of three separate sewer lines crossing the river. One siphon extension is an 8-inch diameter sewer main; the second siphon extension is a 6-inch diameter sewer main, and the third siphon extension is an 8-inch diameter sewer main. From personal, visual accounts, this 3-barrel siphon has overflowed sewage onto the ground, out of the siphon manhole. This overflow issue may be the result of inadequate design, debris in the siphon obstructing flow or simply too much wet weather flow trying to pass through it.

The Indian Hills SPS is located within the overall service area of the Northside SPS. This station has the unique ability to either pump sewage flow to the Northside SPS, via the 3-barrel siphon or pump sewage flow across the North Fork Little River to the interceptor leading to the Millbrooke SPS. All sewage entering the Millbrooke SPS is eventually transported to the Hammond Wood WWTP. It is recommended that the Indian Hills SPS pump all raw sewage to the Millbrooke SPS to provide some flow capacity relief to the 3-barrel siphon and the Northside SPS, particularly during wet weather events. An engineering investigation of this siphon is underway as part of the Priority No. 3 Sewer System Rehabilitation Project.

The other siphon, presently under investigation in this Regional Facility Plan, is the main interceptor sewer siphon crossing the North Fork Little River, directly into the Hammond Wood WWTP site. This 3-barrel siphon consists of three separate sewer lines crossing the River. One siphon barrel is a 10-inch diameter sewer main; the second siphon barrel is a 20-inch diameter sewer main, and the third siphon barrel is a 24-inch diameter sewer main.

According to HWEA personnel, the 10-inch diameter siphon barrel has been completely silted in with gravel, sewage solids and debris. HWEA personnel also claim to have seen a large rock stuck in the middle of the 20-inch diameter barrel of the siphon, essentially rendering it useless for efficiently transferring raw sewage across the River. The remaining 24-inch diameter barrel of the siphon does not have the capacity alone, to handle wet weather flows, causing the siphon to overflow raw sewage during periods of wet weather. This Regional Facility Plan presents preliminary planning to decommission this siphon and replace it with a new gravity sewer interceptor crossing the North Fork Little River into a new, raw sewage lift station, on the WWTP site.

4. <u>Hunting Creek No. 1 SPS</u>

The Hunting Creek No. 1 SPS is located on the west bank of the South Fork Little River, at the end of Hunting Creek Road. It receives raw sewage from the Hunting Creek No. 2 SPS and the surrounding residential areas. It then pumps the raw sewage to the north end of Hunting Creek Road to a receiving manhole that is tributary to the Michael Avenue SPS. Directly across the river from the Hunting Creek No. 1 SPS is the 36-inch sewer interceptor that receives sewage flow from the Michael Avenue SPS and conveys the flow south to the Foston Chapel SPS.

It would require approximately 200 linear feet of 4-inch force main to cross the South Fork Little River to connect the Hunting Creek No. 1 station to the 36-inch interceptor. The efficiency of this flow change is that the amount of flow leaving the Hunting Creek No. 1 station would not have to be pumped again at the Michael Avenue station to eventually get into the same 36-inch sewer interceptor. This option would also provide the same additional flow capacity at the Michael Avenue station. The Hunting Creek No. 1 station has two 100-gpm pumps that are capable, as is, of pumping the raw sewage across the River to the existing 36-inch interceptor. This option is presented in Figure 1 and is currently under consideration as part of the Priority No. 3 Sewer System Rehabilitation project which is currently under design.

5. North Main Street SPS

The North Main Street SPS is located on the east side of North Main Street, just north of the access road to the North and South Quarries. It receives raw sewage from the Concord Lane SPS and Simpson Lane SPS and the surrounding commercial and residential areas. It then pumps the raw sewage south along North Main Street approximately 1,500 feet, to a receiving manhole that is tributary to the Riverfront SPS.

Across North Main Street from the North Main Street SPS is an 8-inch diameter gravity sewer in Adams Avenue that is tributary to the 42-inch North Fork Little River interceptor, which discharges into the Northside SPS. This option would require approximately 1,000 linear feet of 4-inch force main to cross North Main Street and connect into the 8-inch gravity sewer in Adams Avenue. The efficiency of this flow change is that the amount of flow leaving the North Main Street SPS would not have to be pumped again at the Riverfront SPS to eventually get into the same 42-inch sewer interceptor. This proposed new route would also allow for the same sewage flow reduction through the Riverfront SPS, providing it more available capacity. The North Main Street SPS has two 170 gpm pumps that are capable, as is, of pumping the raw sewage to the existing 8-inch gravity sewer in Adams Avenue. This option is presented in Figure 2.

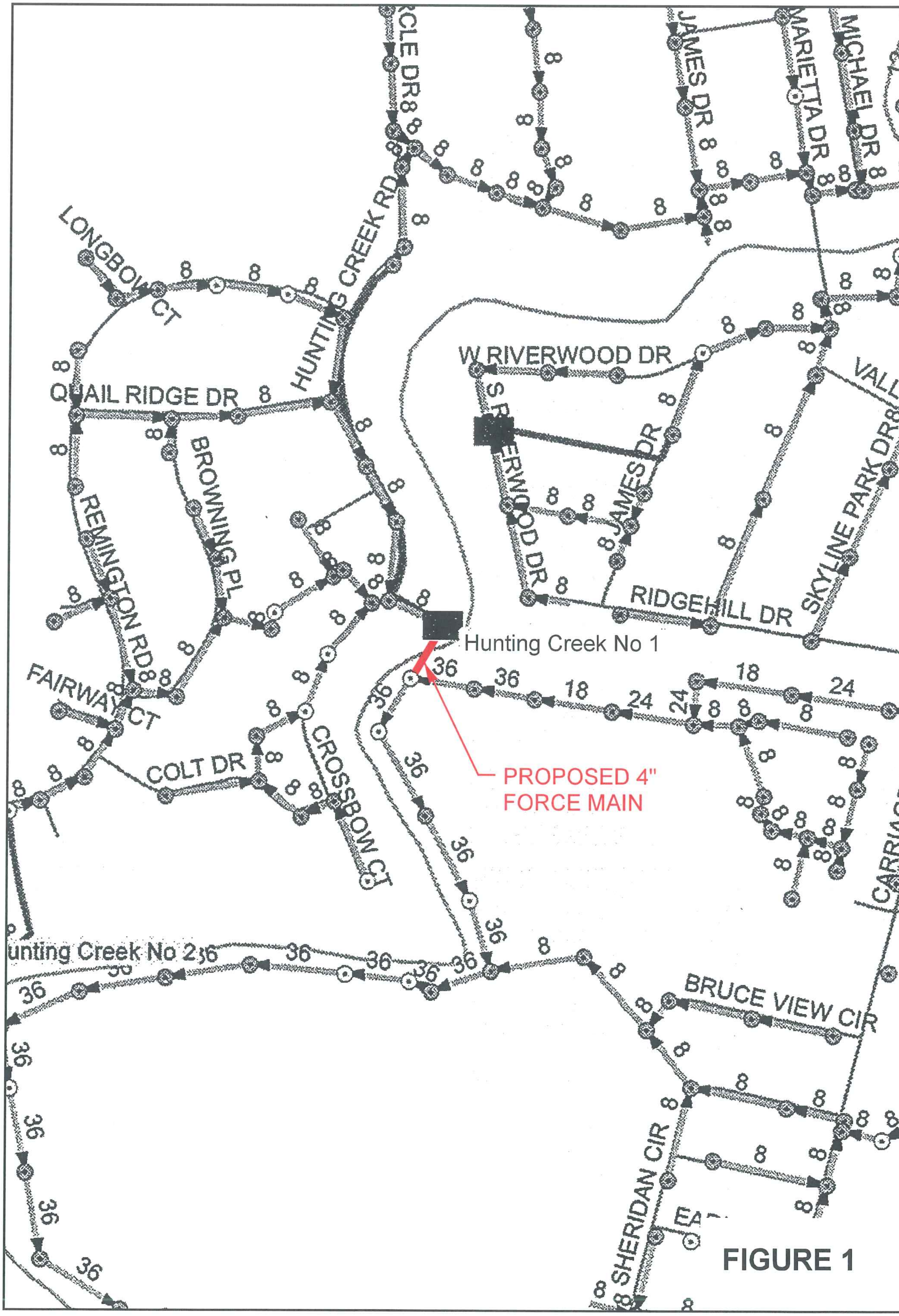
6. Proposed TVA Mega-Site SPS and Force Main / Proposed Phase I Rock Bridge Sewer Interceptor

The proposed TVA Mega-Site sewage pump station and force main are discussed in detail in the report titled "*Oak Grove Wastewater Treatment Plant and Sewage Pumping Stations Evaluation*". The TVA Mega-Site station is to be located in the northeast quadrant of the I-24 and Fort Campbell Boulevard (US 41A) intersection. The force main is proposed to extend from the Station along the Department of Defense (DOD) railroad to its intersection with the Rock Bridge Branch. The force main would then follow the Rock Bridge Branch west to its intersection with the South Fork Little River. It would then cross the South Fork Little River, extending west through a residential area to the North Fork Little River, which it would cross and extend into the Hammond Wood WWTP site. This proposed route is approximately 6.25 miles. These proposed facilities are shown in Figure 3.

The proposed TVA Mega-Site pump station location and force main route offers a few strategy options to create a more flow-efficient collection system. The proposed location of the Mega-Site SPS should allow for the removal of the I-24 sewage pump station. The proposed location of the Mega-Site force main, along the DOD railroad right-of-way, should also allow for the connection of the Novadell SPS, which presently receives sewage flow from the I-24 SPS, the Windmill Farms SPS and the Southpark SPS, and pumps all of these flows to the gravity sewer system tributary to the Rock Bridge SPS. This Novadell SPS connection to the Mega-Site force main would require the installation of approximately 500 feet of 6-inch force main and the replacement of the Novadell SPS pumps. However, if the Phase I Rock Bridge interceptor replaces the Rock Bridge SPS, then there is no pump-savings advantage to divert the Novadell flow to the Mega-Site force main.

An option to consider for the most flow and cost efficiency of the Hopkinsville sewer collection system in this southern sector, if the Mega-Site pump station and force main and the Phase I Rock Bridge interceptor are both constructed in the same period of time, is to extend a leg of the interceptor, south from the Rock Bridge station, paralleling the existing 8-inch diameter gravity sewer, to the existing connection of the force main from the Novadell station. This interceptor leg would be sized to receive the Novadell sewage flow and the TVA Mega-Site sewage flow. This option would require the Mega-Site force main to be extended out of the DOD railroad right-of-way, approximately 1,000 feet north of its intersection with Locust Grove Road, in a westerly direction to Highway 41A, to its connection into the new Phase I Rock Bridge interceptor extension. This option is presented in Figure 4.

If, due to financing, uncertainty of the development of the Mega-Site or other reasons, the Phase I Rock Bridge interceptor is to be constructed some time before the Mega-Site pump station and force main, then it may be more cost efficient and flow efficient to construct the Phase I Rock Bridge interceptor without a leg extension south along Highway 41A. In this case, the Phase I Rock Bridge interceptor would be constructed to include a future connection of the Mega-Site force main at the intersection of the DOD railroad right-of-way and the Rock Bridge Branch. The Phase I Rock Bridge interceptor would be upsized, at this intersection, to carry the additional, projected flows from the Mega-Site station. The existing pump stations, force mains and gravity sewers along Highway 41A, tributary to the Rock Bridge SPS, would keep the same operation and function. This option is shown in Figure 5.



LONGBOW CT
HUNTING CREEK RD
QUAIL RIDGE DR
BROWNING PL
REMINGTON RD
FAIRWAY CT
COLT DR
CROSSBOW CT
W RIVERWOOD DR
JAMES DR
MARIETTA DR
MICHAEL DR
SKYLINE PARK DR
RIDGEHILL DR
Hunting Creek No 1
PROPOSED 4" FORCE MAIN
Hunting Creek No 2
BRUCE VIEW CIR
SHERIDAN CIR

FIGURE 1

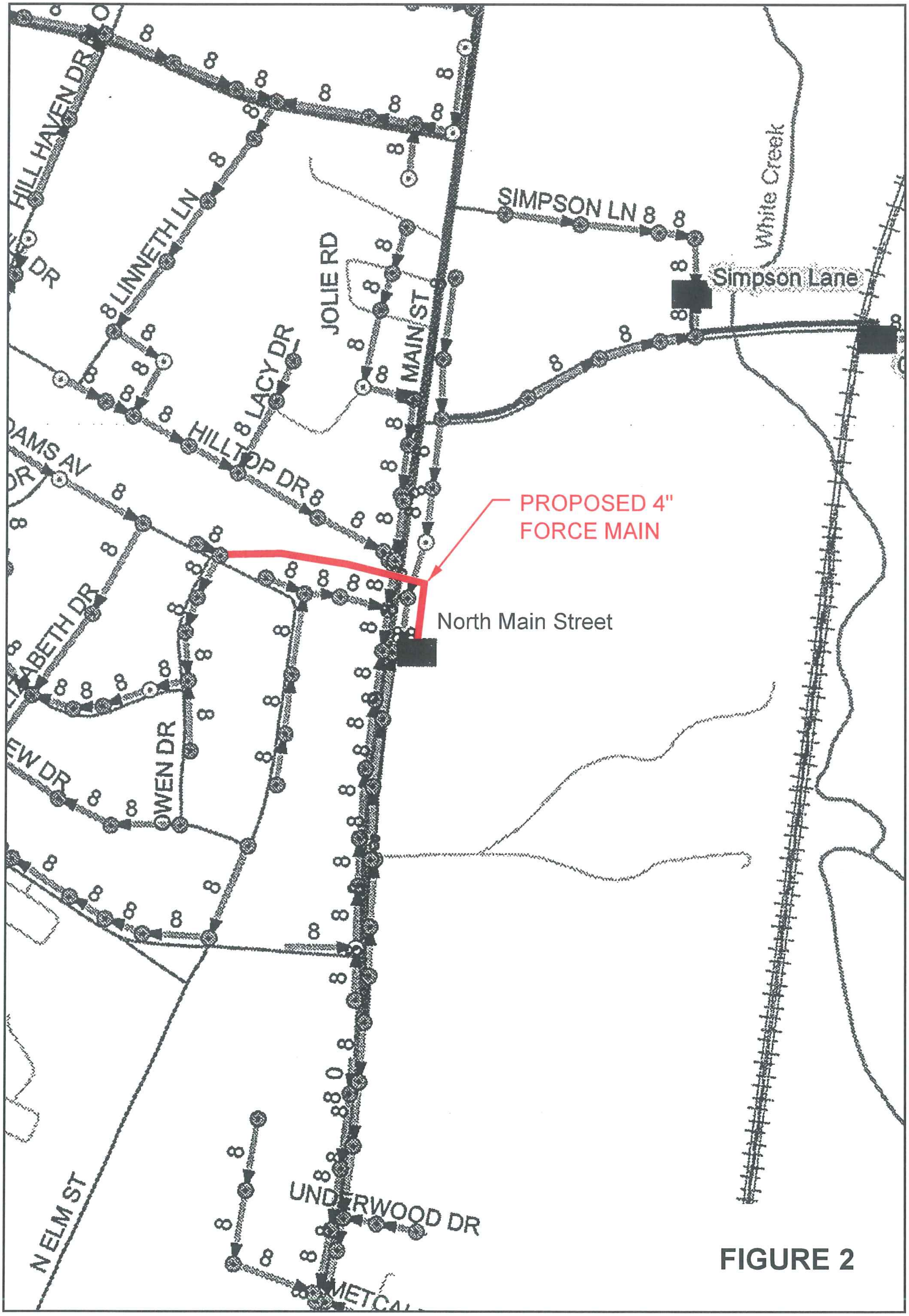

PROPOSED 4"
FORCE MAIN
North Main Street
Simpson Lane
SIMPSON LN
White Creek
MAIN ST
JOLIE RD
LACY DR
HILLTOP DR
LINNETH LN
HILL HAVEN DR
ELIZABETH DR
OWEN DR
UNDERWOOD DR
N ELM ST

FIGURE 2

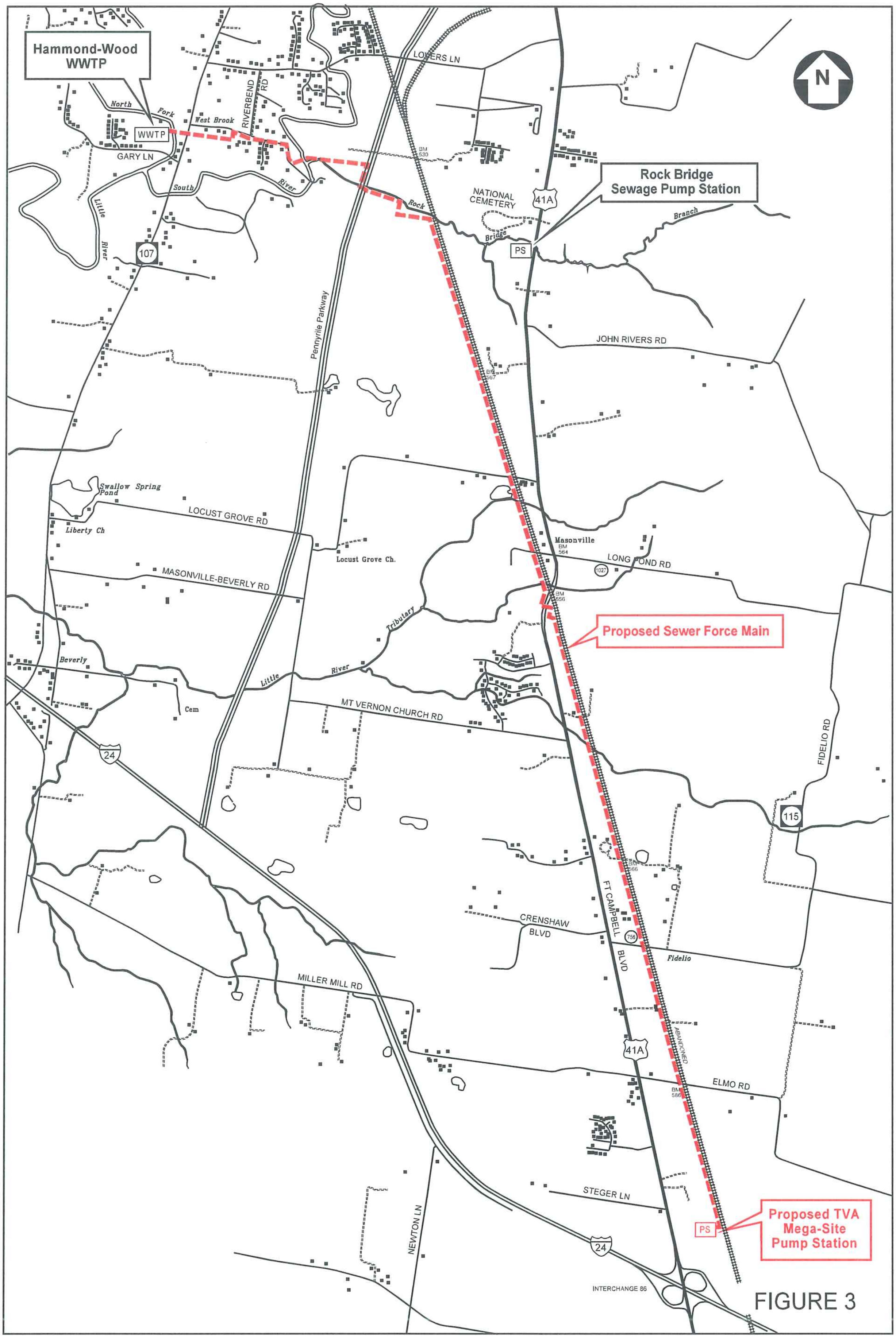
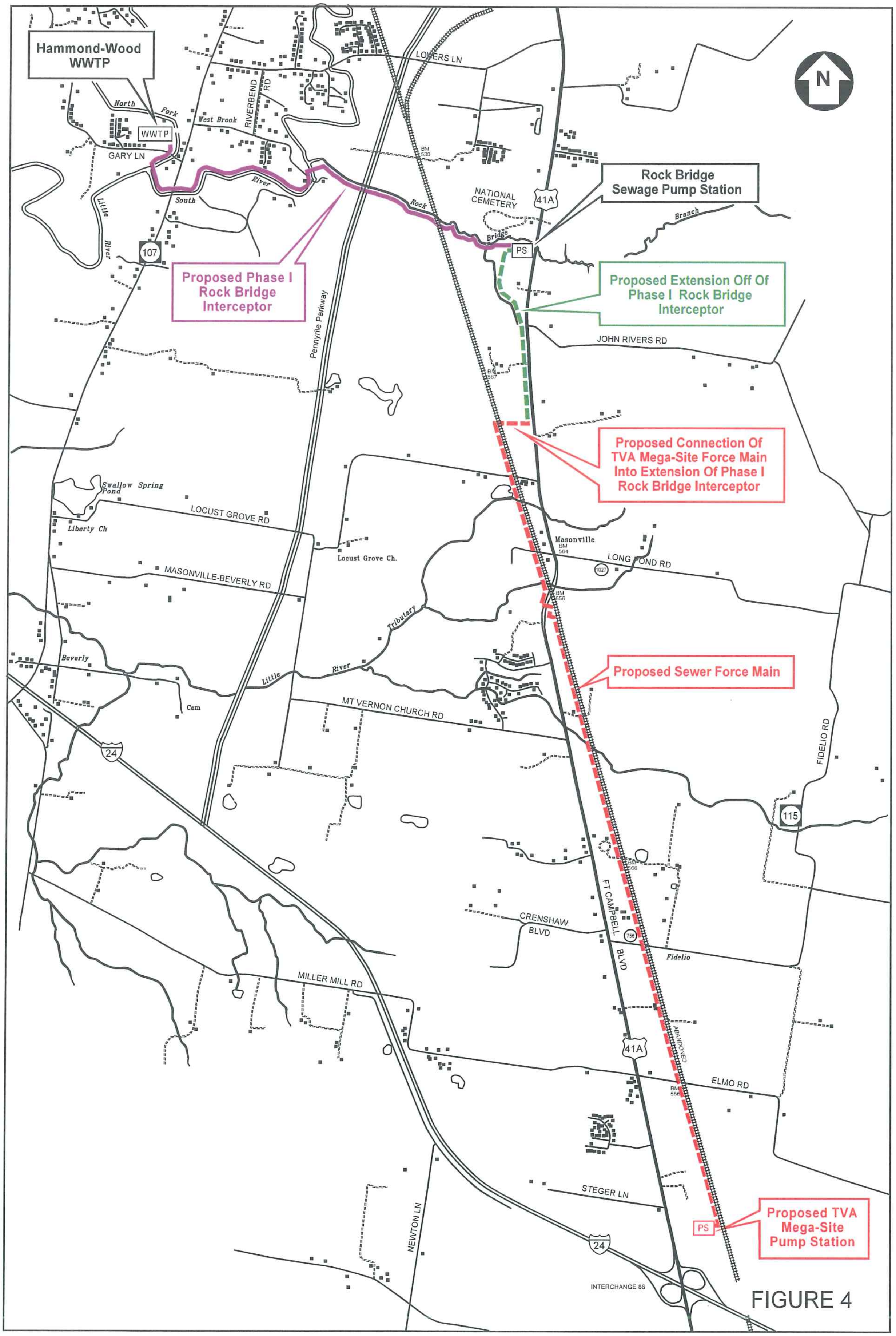
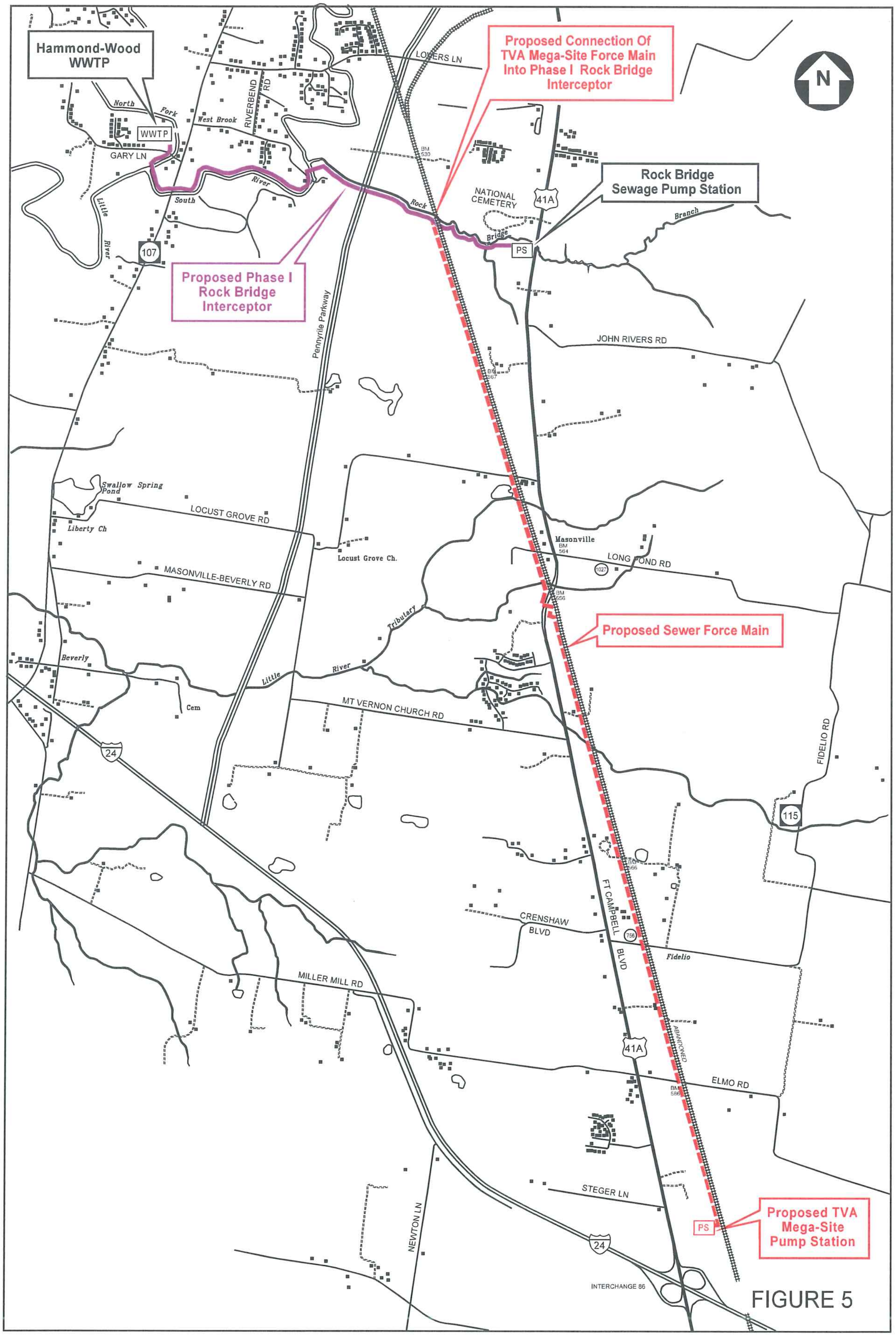

Hammond-Wood
WWTP
WWTP
North Fork
West Brook
RIVERBEND RD
GARY LN
South River
Little River
107
LOWERS LN
NATIONAL
CEMETERY
41A
Rock Bridge
Sewage Pump Station
PS
Rock Bridge Branch
N
Pennyrile Parkway
JOHN RIVERS RD
Swallow Spring Pond
LOCUST GROVE RD
Liberty Ch
Locust Grove Ch.
MASONVILLE-BEVERLY RD
Masonville
LONG POND RD
Proposed Sewer Force Main
Tributary
Little River
Beverly
Cem
MT VERNON CHURCH RD
24
FIDELIO RD
115
CRENSHAW
BLVD
FT CAMPBELL BLVD
Fidelio
MILLER MILL RD
41A
ELMO RD
STEGER LN
NEWTON LN
Proposed TVA
Mega-Site
Pump Station
PS
24
INTERCHANGE 86

FIGURE 3



Hammond-Wood WWTP
WWTP
North Fork
West Brook
RIVERBEND RD
LOWERS LN
GARY LN
South River
Rock Bridge
Little River
107
Proposed Phase I Rock Bridge Interceptor
Pennyrile Parkway
NATIONAL CEMETERY
41A
Rock Bridge Sewage Pump Station
Branch
PS
Proposed Extension Off Of Phase I Rock Bridge Interceptor
JOHN RIVERS RD
Proposed Connection Of TVA Mega-Site Force Main Into Extension Of Phase I Rock Bridge Interceptor
Swallow Spring Pond
LOCUST GROVE RD
Liberty Ch
Locust Grove Ch.
Masonville
LONG POND RD
1027
MASONVILLE-BEVERLY RD
Tributary
Beverly
Little River
Cem
Proposed Sewer Force Main
MT VERNON CHURCH RD
24
FIDELIO RD
115
CRENSHAW BLVD
FT CAMPBELL BLVD
756
Fidelio
MILLER MILL RD
41A
ELMO RD
STEGER LN
NEWTON LN
24
PS
Proposed TVA Mega-Site Pump Station
INTERCHANGE 86
N

FIGURE 4



Hammond-Wood WWTP
WWTP
Proposed Connection Of TVA Mega-Site Force Main Into Phase I Rock Bridge Interceptor
Rock Bridge Sewage Pump Station
PS
Proposed Phase I Rock Bridge Interceptor
Proposed Sewer Force Main
Proposed TVA Mega-Site Pump Station
N
LOVERS LN
RIVERBEND RD
West Brook
North Fork
GARY LN
South River
Little River
Rock Bridge Branch
NATIONAL CEMETERY
41A
107
Pennyrile Parkway
JOHN RIVERS RD
Swallow Spring Pond
LOCUST GROVE RD
Liberty Ch
Locust Grove Ch.
Masonville
LONG POND RD
MASONVILLE-BEVERLY RD
Tributary
Beverly
Little River
Cem
MT VERNON CHURCH RD
24
FIDELIO RD
115
CRENSHAW BLVD
FT CAMPBELL BLVD
Fidelio
MILLER MILL RD
ELMO RD
STEGER LN
NEWTON LN
INTERCHANGE 86

FIGURE 5

Appendix B

Wet Weather Events Assessment / Infiltration-Inflow Reduction

Wet Weather Events Assessment / Infiltration-Inflow Reduction

A. General

This report includes an assessment of the impact of wet weather events on the sewer collection, pumping and transmission, and treatment facilities of Hopkinsville, Oak Grove and Crofton. It also includes strategies to locate and reduce excessive infiltration and inflow by definition of the Kentucky Division of Water (KDOW). An analysis of the excessive infiltration and inflow was included in the 2001 Facilities Plan Update. At that time, the year 2000 annual average daily domestic wastewater flow of 4.83 million gallons per day (MGD), exclusive of the industrial flow of 0.85 MGD, for the sewer system as a whole, yielded a flow of 115.2 gallons per capita per day (gpcpd) of sewered population, slightly less than the KDOW limit of 120 gpcpd for excessive infiltration.

Based upon the year 2000 maximum daily influent wastewater flow of 10.87 MGD, exclusive of the maximum daily industrial flow of 1.5 MGD, the per capita flow of sewered population was found to be 271 gpcpd. That flow also was slightly less than the KDOW limit of 275 gpcpd, "therefore, the sewer system, as a whole, was considered to have non-excessive inflow". However, the 2001 Facilities Plan Update recommended that "HWEA pursue an aggressive Sewer System Evaluation Study (SSES)" due to the age of some of the oldest areas of the sewer collection system.

B. Excessive Inflow / Infiltration Update

In an effort to update the calculations for excessive inflow and infiltration (I/I), WWTP Monthly Operating Reports (MORs) were reviewed for the year 2013, the most recent, complete calendar year. The assessment period for excessive I/I wastewater flows in the cities of Hopkinsville, Oak Grove and Crofton is taken to be the calendar year 2013. According to HWEA, the estimated 2013 populations of Hopkinsville, Oak Grove and Crofton, provided sewer service, were 29,797, 7,182 and 789, respectively. Also per HWEA, the 2013 annual, average daily industrial wastewater flow in Hopkinsville is 0.23 MGD, while Oak Grove and Crofton have no measurable industrial flows.

Tables 1 through 3 show the daily influent wastewater flows for each month for the Hammond Wood WWTP, the Oak Grove WWTP and the Crofton WWTP during the assessment period of 2013, highlighting the minimum, average and maximum daily influent flows. From these Tables, an annual average daily influent flow for 2013 was calculated for each of the three cities. For Hopkinsville, the annual average daily influent flow was 4.42 MGD; for Oak Grove, the annual average daily influent flow was 0.35 MGD; and for Crofton, the annual average daily influent flow was 0.243 MGD. Also from these Tables, a maximum daily influent flow for 2013 was noted for each of the three cities. For Hopkinsville, the maximum daily influent flow was 12.45 MGD; for Oak Grove, the maximum daily influent flow was 1.93 MGD; and for Crofton, the maximum daily influent flow was 1.95 MGD.

The Kentucky Division of Water (KDOW) defines excessive infiltration as the annual average daily domestic wastewater flow per capita, exclusive of any industrial flow, for the sewer system as a whole, found to be greater than the KDOW limit of 120 gpcpd. Based upon the 2013 sewered population of 29,797, the annual average daily domestic wastewater flow of 4.42 MGD for Hopkinsville, and the average daily industrial flow of 0.23 MGD, the 2013 average daily domestic wastewater flow per capita is 141 gpcpd. That per capita flow, indicating some excessive infiltration, is 17% greater than the KDOW limit of 120 gpcpd.

For Oak Grove, with an estimated 2013 sewered population of 7,182, an annual average daily domestic wastewater flow of 0.35 MGD, and no average daily industrial flow, the 2013 average daily domestic wastewater flow per capita is 49 gpcpd. That per capita flow indicates no excessive

Table 1 Hammond-Wood Wastewater Treatment Plant
2013 Daily Influent Wastewater Flow (MGD)

	January	February	March	April	May	June	July	August	September	October	November	December
1	3.53	5.51	4.86	4.50	7.26	6.52	3.31	3.39	4.59	3.26	3.48	2.96
2	3.92	5.38	5.44	4.06	6.28	4.30	3.11	3.37	3.39	4.08	3.11	3.20
3	3.66	4.49	4.04	3.89	5.75	5.57	3.06	3.43	3.40	3.05	2.89	3.27
4	3.42	4.33	4.20	3.83	8.66	5.33	2.97	3.08	3.21	3.17	3.20	3.16
5	3.18	4.02	5.25	3.60	5.95	5.11	4.64	3.36	3.30	4.29	3.08	3.44
6	3.00	3.75	4.40	3.42	6.06	6.11	**6.89**	3.34	3.09	**8.79**	3.74	3.98
7	3.33	4.00	4.35	3.20	5.89	5.86	6.47	3.49	2.86	4.96	3.20	3.43
8	3.16	4.10	4.13	3.45	5.56	5.72	4.79	3.32	2.90	4.78	3.24	4.46
9	3.17	3.71	3.69	3.38	5.06	5.20	4.22	3.43	3.20	4.30	2.90	4.42
10	4.38	4.20	4.75	3.36	9.11	**8.49**	3.78	4.28	3.17	3.79	2.80	4.28
11	7.21	4.16	**9.37**	6.67	**9.56**	5.94	3.60	3.24	3.49	3.69	3.08	4.03
12	4.70	4.02	8.86	8.93	5.99	5.42	3.21	**8.64**	3.27	3.04	3.04	3.83
13	9.27	3.89	7.31	6.30	5.85	5.16	2.96	3.83	3.65	2.88	3.12	3.83
14	**9.47**	3.62	6.80	5.10	5.34	4.73	2.91	3.38	3.19	3.11	3.09	5.44
15	8.02	3.53	6.81	4.92	4.87	4.10	3.04	3.14	3.07	3.14	2.99	4.01
16	6.50	3.28	5.84	4.85	4.39	3.75	3.07	3.16	3.44	3.11	2.86	4.30
17	5.75	3.05	6.11	4.61	4.16	5.33	3.13	5.42	3.21	3.25	6.15	4.03
18	5.01	3.81	8.39	3.84	3.80	5.58	3.40	4.73	3.26	3.00	5.87	3.88
19	4.53	3.60	7.71	7.89	3.55	4.51	3.31	4.19	3.41	2.87	4.65	3.69
20	3.98	3.50	6.59	5.64	3.62	4.16	3.00	3.42	**6.09**	2.81	4.15	5.52
21	4.01	5.25	6.02	4.68	4.40	3.71	3.60	5.37	4.96	3.17	4.05	**12.45**
22	3.88	6.35	5.57	4.84	4.60	3.21	5.73	3.42	3.44	3.24	**6.18**	9.12
23	3.76	5.86	5.27	4.52	3.60	3.10	4.86	4.36	3.34	3.02	3.86	8.42
24	3.56	4.25	5.96	7.26	3.46	3.30	4.18	3.51	3.44	2.96	3.61	5.52
25	3.47	4.32	5.41	5.45	3.09	3.26	3.71	3.35	3.35	2.91	3.65	4.96
26	3.46	**7.57**	4.88	5.77	3.04	3.82	3.62	3.45	3.37	2.85	3.71	4.96
27	2.99	5.62	4.88	9.40	3.06	3.39	3.30	3.71	3.06	2.67	3.47	4.76
28	4.04	5.11	4.52	9.58	3.22	3.04	3.07	4.43	2.81	3.10	3.03	4.24
29	4.91		4.24	**9.61**	3.25	3.17	3.49	4.06	3.36	3.13	3.10	4.54
30	6.19		4.83	9.01	3.08	3.11	3.62	3.67	3.13	3.34	3.03	4.33
31	6.18		4.60		4.11		3.54	3.26		4.13		3.90
Min.	2.99	3.05	3.69	3.20	3.04	3.04	2.91	3.08	2.81	2.67	2.80	2.96
Avg.	4.65	4.44	5.68	5.52	5.05	4.67	3.80	3.90	3.45	3.54	3.61	4.72
Max.	9.47	7.57	9.37	9.61	9.56	8.49	6.89	8.64	6.09	8.79	6.18	12.45

Table 2 Oak Grove Wastewater Treatment Plant
2013 Daily Influent Wastewater Flow (MGD)

	January	February	March	April	May	June	July	August	September	October	November	December
1	0.334	0.346	0.359	0.417	**1.220**	0.335	0.335	0.350	0.308	0.279	0.338	0.264
2	0.330	0.313	0.336	0.363	0.792	***0.187***	0.313	***0.240***	0.371	0.284	0.252	0.307
3	0.298	0.369	0.345	***0.282***	0.503	0.352	0.314	0.313	0.350	0.299	0.252	0.259
4	***0.292***	0.392	0.396	0.349	0.700	0.334	0.286	0.314	0.295	0.274	0.295	0.287
5	0.295	0.368	0.352	0.360	0.634	0.313	0.432	0.324	0.287	0.257	0.272	0.269
6	0.326	0.349	0.379	0.328	0.739	0.337	0.346	0.307	0.300	0.281	0.256	0.265
7	0.343	0.344	0.345	0.361	0.652	0.345	**0.456**	0.317	0.305	0.274	0.261	0.309
8	0.318	0.360	0.324	0.374	0.628	0.317	0.359	0.341	0.315	0.281	0.235	0.267
9	0.303	0.333	***0.306***	0.332	0.564	0.313	0.286	0.344	0.362	0.258	0.246	0.328
10	0.339	0.381	0.342	0.322	0.511	**0.433**	0.286	0.304	0.306	0.248	0.263	0.270
11	0.394	0.427	0.615	0.355	0.641	0.367	0.269	0.371	0.318	0.253	0.261	0.251
12	0.322	0.340	**0.650**	0.726	0.583	0.319	0.278	0.373	0.248	0.245	0.295	0.274
13	0.372	0.332	0.432	0.458	0.546	0.320	0.257	**0.409**	0.371	0.260	0.235	0.244
14	**0.858**	0.341	0.383	0.425	0.478	0.311	0.296	0.320	0.272	0.267	0.245	0.279
15	0.436	0.330	0.384	0.466	0.460	0.305	0.342	0.347	0.308	0.309	0.242	0.301
16	0.385	0.316	0.357	0.396	0.421	0.302	0.299	0.264	0.356	0.279	0.240	0.332
17	0.382	0.341	0.366	0.364	0.418	0.317	0.297	0.306	0.315	0.276	0.285	0.288
18	0.376	0.381	0.480	0.333	0.409	0.322	0.287	0.354	0.306	0.262	**0.464**	0.272
19	0.356	0.425	0.518	0.472	0.399	0.313	0.324	0.375	0.296	0.252	0.280	0.279
20	0.376	0.349	0.395	0.409	0.437	0.196	0.288	0.325	0.325	0.266	**0.229**	0.278
21	0.350	***0.311***	0.366	0.382	0.384	0.303	0.308	0.310	**0.468**	0.303	0.269	0.328
22	0.366	0.394	0.375	0.398	0.458	0.330	0.423	0.321	0.364	0.276	0.270	**0.468**
23	0.295	0.346	0.369	0.324	0.302	0.300	0.369	0.322	0.358	0.252	0.251	0.310
24	0.331	0.359	0.392	0.378	***0.285***	0.321	0.307	0.294	0.306	0.240	0.265	0.270
25	0.314	**0.454**	0.453	0.430	0.357	0.314	0.286	0.320	0.198	0.236	0.296	**0.232**
26	0.307	0.328	0.395	0.344	0.322	0.301	0.278	0.366	***0.052***	**0.218**	0.266	0.232
27	0.346	0.363	0.374	0.341	0.318	0.332	***0.104***	0.313	0.241	0.274	0.253	0.249
28	0.387	0.390	0.354	1.059	0.361	0.322	0.303	0.302	0.222	**0.317**	0.259	0.249
29	0.334		0.327	1.615	0.327	0.304	0.342	0.315	0.259	0.264	0.257	0.261
30	0.409		0.377	**1.926**	0.321	0.284	0.303	0.311	0.311	0.283	0.238	0.274
31	0.442		0.403		0.341		0.326	0.289		0.275		0.248
Min.	0.292	0.311	0.306	0.282	0.285	0.187	0.104	0.240	0.052	0.218	0.229	0.232
Avg.	0.365	0.360	0.395	0.503	0.500	0.315	0.313	0.325	0.303	0.269	0.269	0.282
Max.	0.858	0.454	0.650	1.926	1.220	0.433	0.456	0.409	0.468	0.317	0.464	0.468

Table 3 Crofton Wastewater Treatment Plant
2013 Daily Influent Wastewater Flow (MGD)

	January	February	March	April	May	June	July	August	September	October	November	December
1	0.16	0.70	0.22	**1.60**	0.19	0.60	0.08	0.10	**0.30**	0.11	0.20	0.12
2	0.18	0.16	0.22	0.20	0.15	0.58	0.08	0.08	0.29	0.09	**0.22**	0.25
3	0.13	0.16	0.22	0.20	0.12	0.58	0.08	0.07	0.29	0.23	**0.22**	0.25
4	0.11	0.16	0.23	0.20	**0.81**	0.58	0.08	0.07	0.11	0.15	**0.22**	0.25
5	0.10	0.16	0.18	0.20	**0.81**	0.16	0.08	0.07	0.09	**0.59**	0.10	0.25
6	0.10	0.12	0.22	0.10	**0.81**	0.59	**0.95**	0.07	0.08	**0.59**	0.12	0.25
7	0.10	0.10	0.22	0.10	0.38	0.61	**0.95**	0.07	0.08	**0.59**	0.12	0.25
8	0.09	0.27	0.32	0.10	0.25	0.61	**0.95**	0.07	0.08	0.23	0.10	0.25
9	0.09	0.27	0.32	0.10	0.18	0.61	0.20	0.26	0.08	0.19	0.10	0.25
10	0.09	0.27	0.32	0.10	0.57	0.61	0.14	0.26	0.08	0.12	0.10	0.25
11	0.48	0.27	0.32	0.11	0.57	**0.83**	0.12	0.26	0.07	0.12	0.10	0.15
12	**1.95**	0.26	1.29	0.67	0.57	0.20	0.09	0.26	0.07	0.13	0.10	0.50
13	0.75	0.19	0.30	0.67	0.57	0.16	0.08	0.18	0.07	0.15	0.08	0.40
14	0.15	0.21	0.22	0.68	0.17	0.10	0.11	0.14	0.07	0.11	0.06	0.40
15	0.35	0.17	0.22	0.66	0.13	0.10	0.08	0.11	0.07	0.05	0.07	0.40
16	0.22	0.13	0.22	0.14	0.11	0.10	0.03	0.10	0.07	0.05	0.11	0.41
17	0.18	0.13	0.22	0.12	0.10	0.10	0.09	0.14	0.07	0.17	0.11	0.40
18	0.13	0.13	0.22	0.11	0.09	0.09	0.09	0.14	0.06	0.07	0.11	0.18
19	0.13	0.30	**1.33**	0.36	0.09	0.08	0.07	0.14	0.07	0.08	0.20	0.18
20	0.13	0.29	0.29	0.36	0.09	0.07	0.09	0.12	0.06	0.08	0.20	0.55
21	0.13	0.19	0.21	0.36	0.09	0.07	0.09	0.27	0.19	0.08	0.19	0.55
22	0.10	**1.16**	0.17	0.36	0.16	0.07	0.09	0.18	0.25	0.07	0.08	0.33
23	0.09	0.47	0.23	0.36	0.15	0.07	0.15	0.13	0.13	0.07	0.19	**2.91**
24	0.10	0.47	0.23	0.15	0.08	0.07	0.15	0.24	0.10	0.06	0.19	0.24
25	0.10	0.47	0.23	0.89	0.08	0.19	0.10	0.24	0.09	0.07	0.19	0.24
26	0.10	0.42	0.23	0.24	0.08	0.10	0.08	0.24	0.08	0.07	0.14	0.24
27	0.10	0.36	0.21	1.21	0.08	0.10	0.08	0.12	0.08	0.07	0.12	0.24
28	0.10	0.32	0.17	1.21	0.08	0.09	0.08	0.10	0.01	0.07	0.12	0.24
29	0.21		0.12	1.21	0.08	0.08	0.08	0.10	0.10	0.07	0.12	0.25
30	0.73		0.14	0.30	0.07	0.08	0.09	**0.29**	0.20	0.07	0.12	0.21
31	0.70		0.14		0.07		0.10	**0.29**		0.07		0.14
Min.	0.09	0.10	0.12	0.10	0.07	0.07	0.03	0.07	0.01	0.05	0.06	0.12
Avg.	0.26	0.28	0.30	0.44	0.25	0.28	0.18	0.16	0.11	0.15	0.14	0.37
Max.	1.95	1.16	1.33	1.60	0.81	0.83	0.95	0.29	0.30	0.59	0.22	2.91

infiltration in the Oak Grove sewer collection system. For Crofton, with an estimated 2013 sewered population of 789, an annual average daily domestic wastewater flow of 0.243 MGD, and no average daily industrial flow, the 2013 average daily domestic wastewater flow per capita is 308 gpcpd. That per capita flow, indicating excessive infiltration, is almost 160% greater than the KDOW limit of 120 gpcpd.

KDOW defines excessive inflow as the maximum daily (24-hour period) domestic wastewater flow per capita, exclusive of any industrial flow found to be greater than the KDOW limit of 275 gpcpd. Based upon the 2013 sewered population of 29,797, the maximum daily domestic wastewater flow of 12.45 MGD for Hopkinsville, and the average daily industrial flow of 0.23 MGD, the 2013 per capita flow is 410 gpcpd. That per capita flow, indicating excessive inflow, is almost 50% greater than the KDOW limit of 275 gpcpd.

For Oak Grove, with an estimated 2013 sewered population of 7,182, a maximum daily domestic wastewater flow of 1.93 MGD, and no average daily industrial flow, the 2013 per capita flow is 269 gpcpd. That per capita flow indicates no excessive inflow in the Oak Grove sewer collection system, since it is less than the KDOW limit of 275 gpcpd. For Crofton, with an estimated 2013 sewered population of 789, a maximum daily domestic wastewater flow of 1.95 MGD, and no average daily industrial flow, the 2013 per capita flow is 2,471 gpcpd. That per capita flow, indicating strong excessive inflow, is almost 800% greater than the KDOW limit of 275 gpcpd.

TABLE NO. 4
PER CAPITA FLOWS

Year 2013	KDOW Regulations	Hopkinsville	Oak Grove	Crofton
Excessive Infiltration (gpcpd)	120	141	49	308
Excessive Inflow (gpcpd)	275	410	269	2,471

In summary, by KDOW definition of excessive infiltration and inflow, Hopkinsville has a slight problem with excessive infiltration and a moderate problem with excessive inflow. Oak Grove does not presently have a problem with either excessive infiltration or excessive inflow, but is getting very close regarding excessive inflow. Crofton has a serious problem with both excessive infiltration and excessive inflow.

C. Monthly Rainfall and WWTP Influent Flows Relationship

In order to obtain a graphical representation of the existing or potential issues with infiltration and inflow in a sewer collection system, an investigation of the relationship of precipitation within the sewer collection system drainage basin and the resulting influent wastewater flows into the treatment plants was performed. Inflow and infiltration have typically direct and indirect impacts depending on the amount of precipitation that falls in the drainage basin of the sewer collection system. Inflow has a quicker response relationship with WWTP influent flows than infiltration, which contributes a more sustained flow to the WWTP influent after the precipitation event. The impact of both inflow and infiltration on WWTP influent flows can be directly related to the amount of moisture present in the soil prior to the rainfall event. The rainfall and WWTP influent flow records of the calendar years 2012 and 2013 were reviewed and are presented herein, and graphically represented to display their relationship.

The rainfall data for Hopkinsville and Crofton was obtained from the Kentucky Mesonet website, the official weather source for Kentucky climate data. The weather station for Christian County is Station ID: PGHL, located at latitude 36.95°, longitude –87.52°. Rainfall data for Oak Grove was obtained from an HWEA rainfall station site in Oak Grove. Influent flow data for the Hammond-Wood, Oak Grove and Crofton WWTPs was obtained from the respective WWTP MORs. Table Nos. 5 through 8 list the daily rainfall amounts recorded in Hopkinsville and Oak Grove for the years 2012 and 2013.

Figure 1 is a graphical representation of Table Nos. 5 and 6 for rainfall in Hopkinsville in 2012 and 2013. Figure 2 is a graphical representation of Tables Nos. 7 and 8 for rainfall in Oak Grove in 2012 and 2013. Although there are typically certain seasons of the year that are considered to have more rainfall than others, these graphs show that there can be a wide deviation in rainfall amounts for the same months in consecutive years. Typically, the graph of rainfall versus WWTP influent flows for each month will reveal the direct relationship between the two measurements of rainfall and wastewater treatment plant influent flows, more so, for maximum daily influent flows than the average daily influent flows.

Figures 3 through 8 are graphs of monthly totals of rainfall versus the average daily and maximum daily influent wastewater flows at the Hammond Wood WWTP, the Oak Grove WWTP and the Crofton WWTP, for the calendar years 2012 and 2013. Review of the graphs in Figures 3 through 8 indicate visual trends of the total rainfall amounts in the months and the average daily and maximum daily influent flows in that same month. As stated earlier, the residual amount of water (moisture) in the ground, as the result of a single or several large rainfall events in a month, can have a carry-over effect to the next month's daily and maximum influent flows, such as the months of May and June of 2012, shown in Figure 3. Although the month of June had a small amount of rainfall, average daily and maximum

Table 5

2012 Hopkinsville, Kentucky Precipitation (Inches)

	January	February	March	April	May	June	July	August	September	October	November	December
1		0.02			0.02			0.98	0.04	1.36		
2			0.19				0.13	0.03	0.54	0.07		
3					0.02			0.61	0.34			
4		0.40	0.01			0.16			0.02			0.31
5				0.03	0.09				0.33	0.11	0.04	
6					0.11		0.45		0.13	0.08	0.08	0.06
7					2.07				1.10		0.06	0.52
8		0.01	2.69				0.58		0.16			0.04
9	0.14						0.49					1.44
10	0.08	0.05										0.01
11	0.62		0.09			0.34					0.15	
12	0.07		0.11		0.20					0.75	0.68	
13		0.09		0.01	0.40		0.03	0.96				
14		0.16					0.24			0.26		
15		0.14	0.80						0.01			0.10
16	0.02	0.06	0.30	0.15				0.64	0.05			
17	0.37					0.03			1.11	0.68		0.01
18									0.01	0.02		
19		0.01					1.37					
20	0.54			0.04								0.66
21	0.01	0.05		0.17	0.03	0.03						
22	0.14		0.33	0.01								
23	0.72											0.02
24			0.11									0.04
25	0.15		0.01									0.29
26	0.67						0.34		0.44	0.20	0.87	0.75
27				0.05					0.45			
28									0.21			0.25
29		1.54			0.10							0.03
30				0.32			0.15					
31	0.05				0.23							0.24
Total	3.58	2.53	4.64	0.78	3.27	0.56	3.78	3.22	4.94	3.53	1.88	4.77

KY Official Source For Weather Climate Data: Kentucky Mesonet. Station ID: PGHL.
Relative Location: Hopkinsville 6N. County: Christian Co. Location Lat. 36.95° Lon: -87.52°
Elevation: 729 FT. Observation Day: CST

Table 6

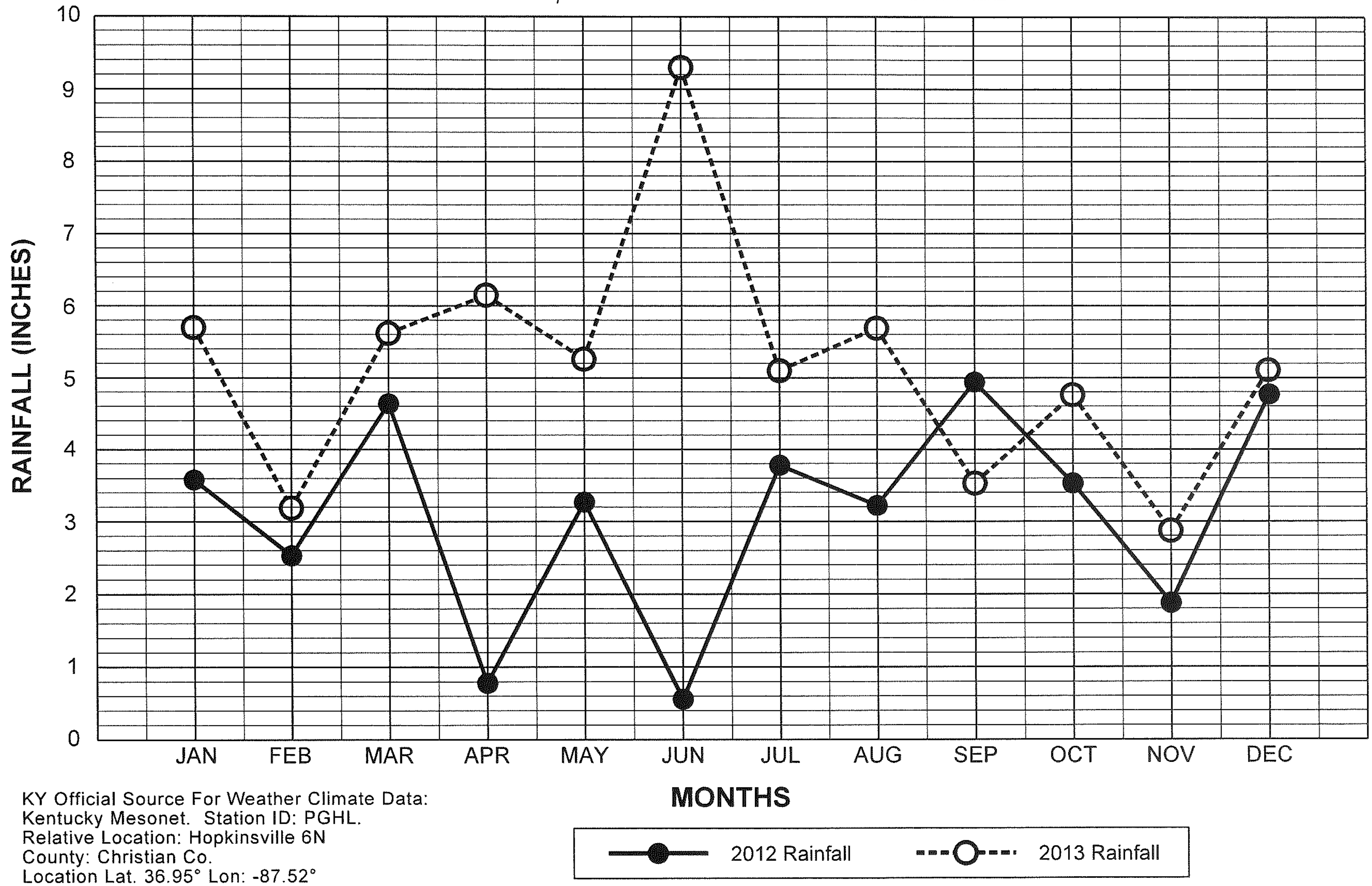
2013 Hopkinsville, Kentucky Precipitation (Inches)

	January	February	March	April	May	June	July	August	September	October	November	December
1	0.03		0.13			3.77	0.01		1.01			
2			0.03							0.65	0.03	
3		0.02			0.16			0.31				
4		0.04		0.05	0.90		0.01					0.01
5			0.30		0.19		1.70	0.17		0.13		0.08
6					0.08	1.50	0.97	0.03		2.48	0.48	0.67
7		0.09						0.04				
8		0.42						1.14				0.31
9						1.39		0.43	0.04			0.01
10	0.30	0.40	1.01		1.84	0.08		1.20				
11	0.77		1.11	1.99								
12								0.76	0.03		0.01	
13	2.39	0.07										0.03
14			0.30									0.57
15	0.01									0.05	0.02	
16				0.03				0.88	0.01	0.15		
17			0.53		0.20	1.48		0.49		0.12	1.83	
18		0.40	1.03	1.11	0.02	0.07	0.06	0.02				
19		0.01		0.18						0.11		
20							0.31	0.06	1.64			0.05
21		0.92			0.88		0.46		0.18	0.06	0.09	2.91
22		0.02			0.02		0.84			0.03	0.30	0.08
23			0.13				0.20	0.16				
24			0.37	0.90		0.06						
25	0.14		0.01								0.06	
26		0.77	0.02	0.37		0.54					0.07	
27	0.09	0.03		1.43			0.02					
28	0.30			0.09								0.13
29			0.21						0.61	0.03		0.26
30	1.65		0.43			0.41	0.51		0.01	0.02		
31	0.02		0.01		0.97		0.01			0.93		
Total	5.70	3.19	5.62	6.15	5.26	9.30	5.10	5.69	3.53	4.76	2.89	5.11

KY Official Source For Weather Climate Data: Kentucky Mesonet. Station ID: PGHL.
Relative Location: Hopkinsville 6N. County: Christian Co. Location Lat. 36.95° Lon: -87.52°
Elevation: 729 FT. Observation Day: CST

2012 - 2013

HOPKINSVILLE, KY - TOTAL MONTHLY RAINFALL



KY Official Source For Weather Climate Data:
Kentucky Mesonet. Station ID: PGHL.
Relative Location: Hopkinsville 6N
County: Christian Co.
Location Lat. 36.95° Lon: -87.52°
Elevation: 729 FT.
Observation Day: CST

FIGURE 1

Table 7

2012 Oak Grove, Kentucky Precipitation (Inches)

	January	February	March	April	May	June	July	August	September	October	November	December
1		0.1	0.1		0.2	0.1				0.4		
2		0.3	0.1						0.8	1.3		
3			0.1					0.3	0.5	0.1		
4		0.3			0.1	0.1		0.1	0.5			
5		0.2			0.2	0.2						0.2
6				0.3	0.1			0.8	0.3	0.2	0.1	
7							0.2				0.1	0.1
8		0.1	0.1						1.1			0.1
9			2.7				0.5		0.2			1.3
10							0.1					1.3
11	1.0						0.1					
12	0.2		0.1			0.2	0.7			0.5	0.8	
13	0.1		0.1		0.4					0.1	0.2	
14		0.3			0.1		1.1	0.8				
15							0.2			0.3		0.1
16		0.1	0.4	0.2								0.1
17			0.3					1.0	0.3			0.1
18	0.6		0.2						0.3	0.7		0.1
19							0.1					
20							1.3					0.5
21	0.6	0.1		0.8			0.1					0.3
22					1.2							
23	1.2		0.4									
24												0.1
25			0.3									
26	0.2											1.4
27	1.7						1.0		0.3	0.3	0.4	0.1
28				0.1					0.1			
29									0.1			
30					1.6		0.1					
31												0.3
Total	5.6	1.5	4.9	1.4	3.9	0.6	5.5	3.0	4.5	3.9	1.6	6.1

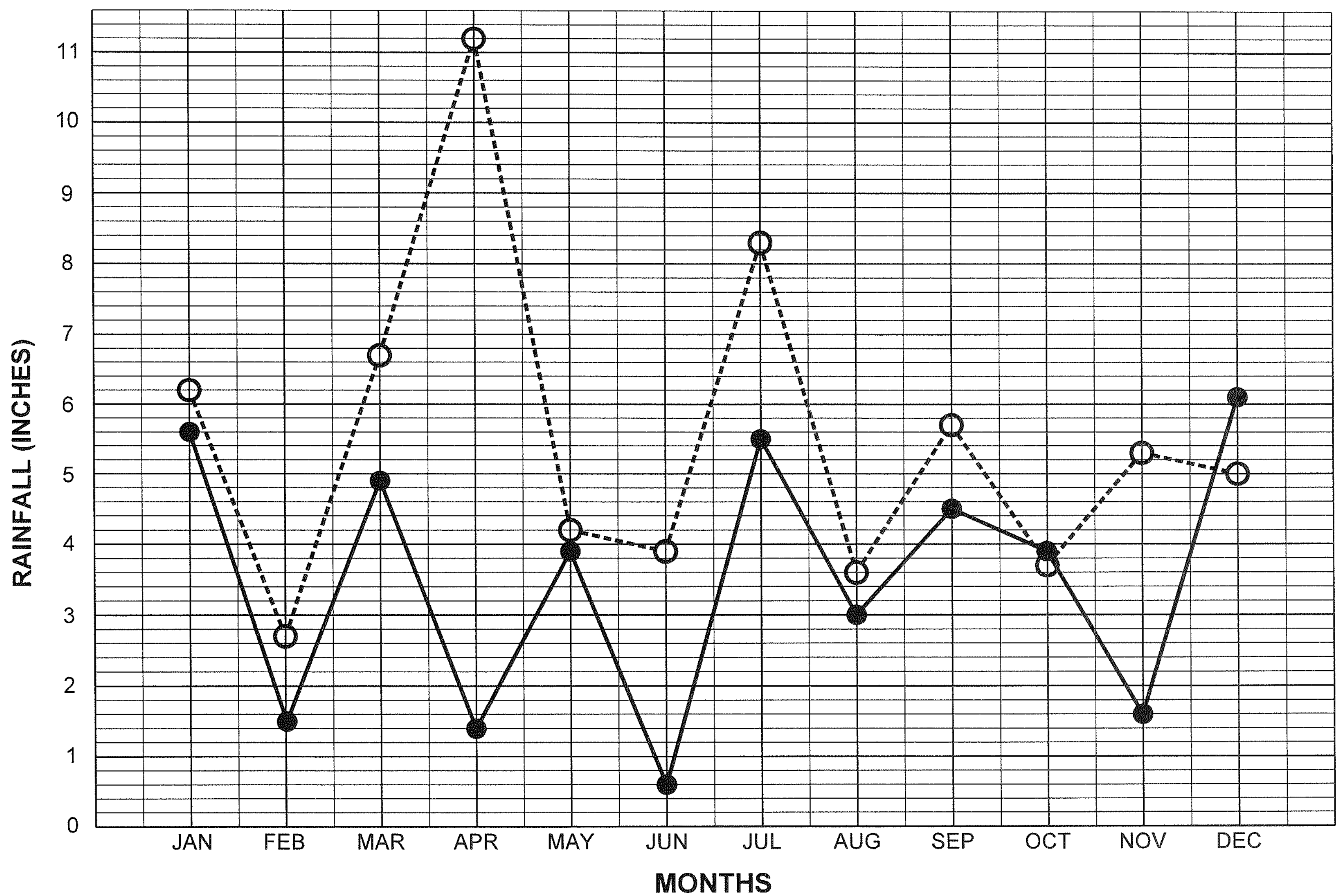
Table 8

2013 Oak Grove, Kentucky Precipitation (Inches)

	January	February	March	April	May	June	July	August	September	October	November	December
1	0.2	0.1				0.3		0.1	1.0		1.9	
2			0.2			0.5	0.1		0.2		0.1	
3							0.1			0.3		
4					1.0		1.1	0.1				
5			0.4	0.3	0.4		2.2			0.1		0.4
6			0.4		0.1	0.4	0.7	0.1		1.5		0.7
7					0.2	0.1	0.5			0.2	0.3	0.6
8		0.3			0.1			0.1				0.2
9			0.1					0.3	0.1			
10	0.6				0.2	1.3		0.2				
11	0.8	0.3	2.5	1.3	0.8	0.1		0.6				
12			0.1	1.6	0.1			0.1	0.8		0.1	
13	1.0	0.1						1.6				
14	1.8	0.1										0.5
15			0.1									0.2
16											0.1	
17								0.1		0.5	0.2	
18			1.1		0.2	0.5		0.3		0.1	1.8	
19		0.5	0.2	1.5			0.8			0.1		
20			0.1	0.1						0.3		0.1
21					0.1		0.1		3.0			0.8
22		0.7			1.0	0.1	2.4			0.2	0.6	1.0
23												
24			0.3	0.9								
25			0.4	0.2					0.3			
26	0.2	0.4									0.2	
27		0.2		1.1		0.6						
28				4.2						0.2		
29	0.1		0.1							0.1		0.4
30	1.5		0.6						0.3			0.1
31			0.3				0.3			0.1		
Total	6.2	2.7	6.9	11.2	4.2	3.9	8.3	3.6	5.7	3.7	5.3	5.0

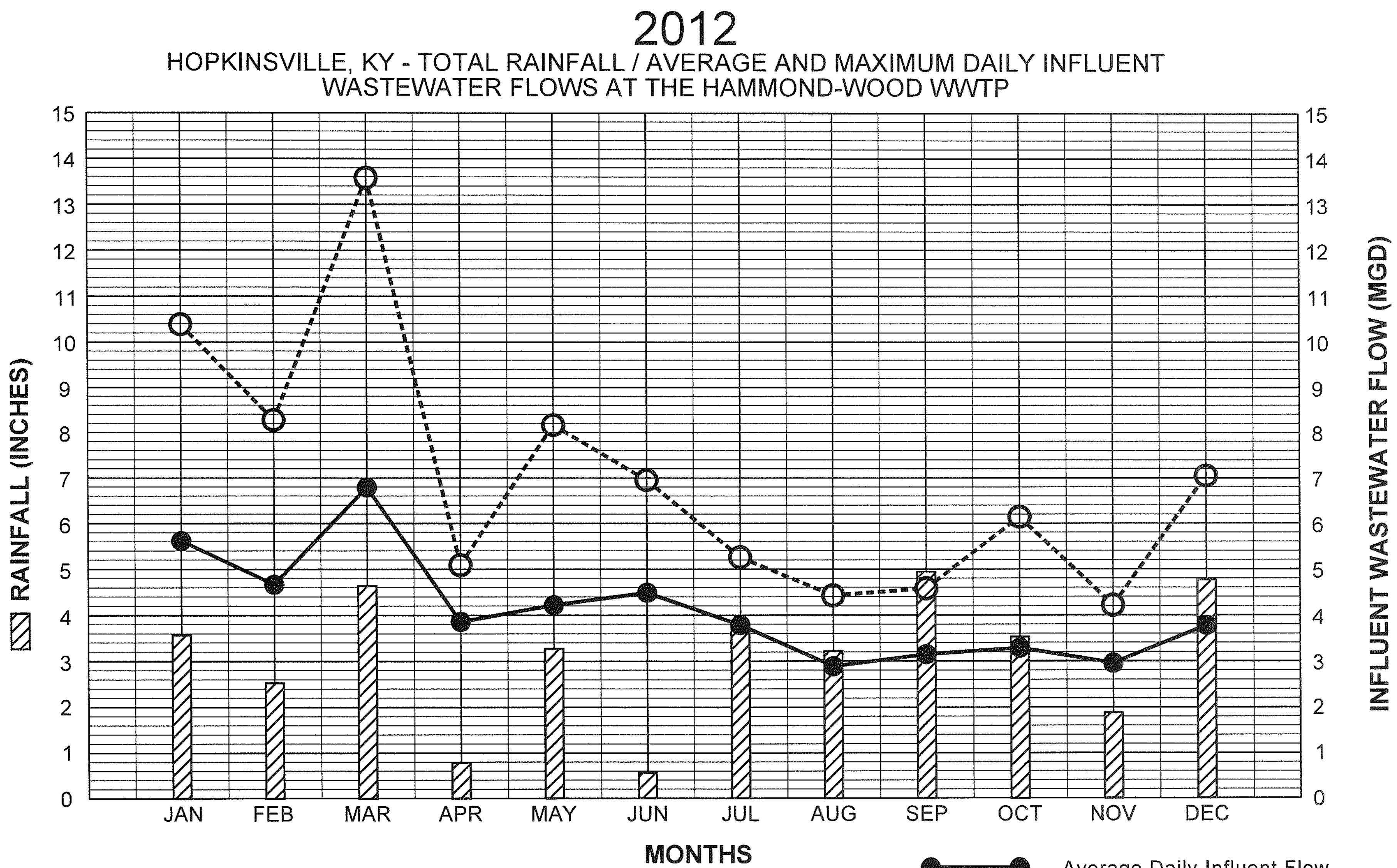
2012 - 2013

OAK GROVE, KY - TOTAL MONTHLY RAINFALL



HWEA Rainfall Gauge
Oak Grove, Ky.

FIGURE 2



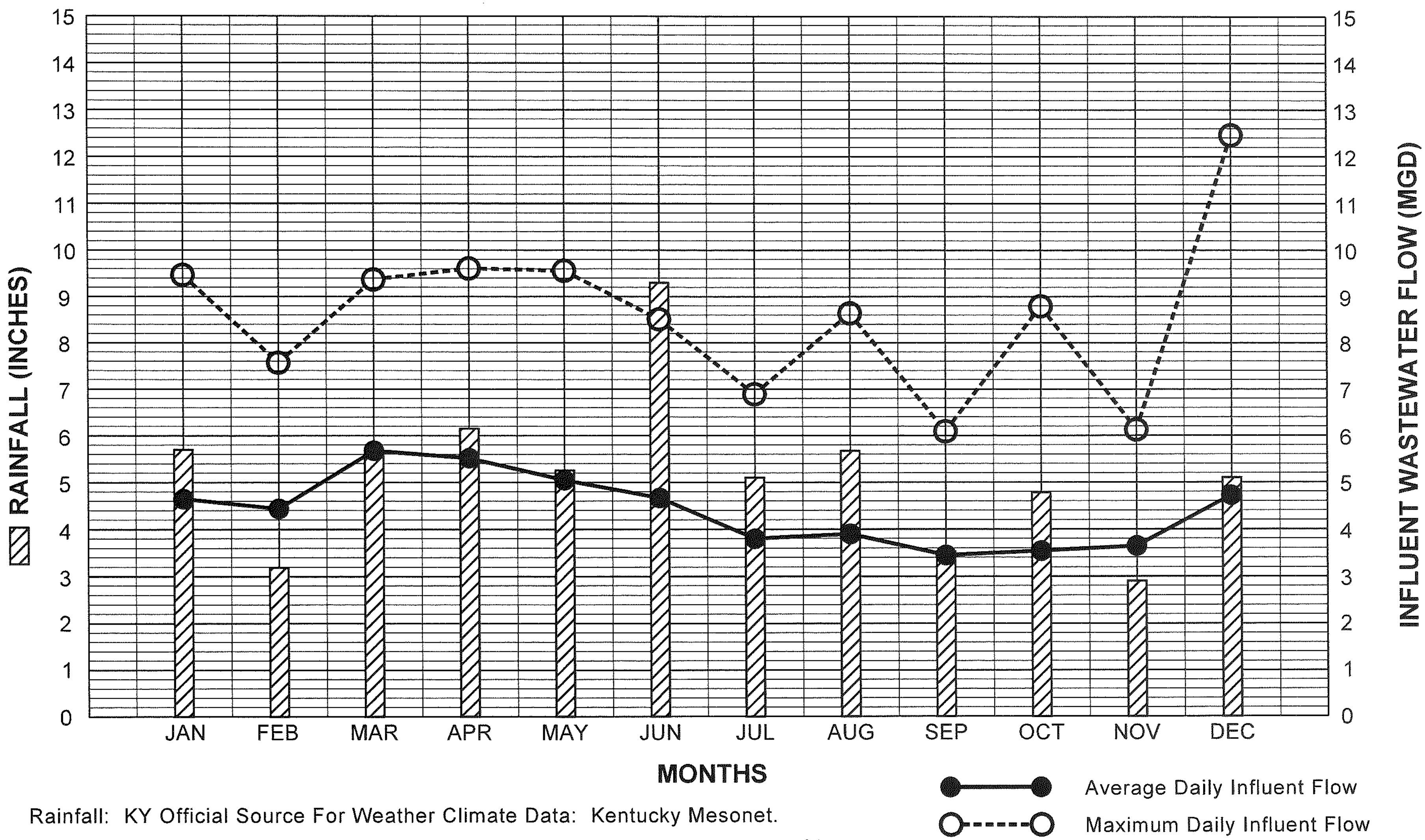
Rainfall: KY Official Source For Weather Climate Data: Kentucky Mesonet.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Northside WWTP And Hammond-Wood WWTP

FIGURE 3

2013

HOPKINSVILLE, KY - TOTAL RAINFALL / AVERAGE AND MAXIMUM DAILY INFLUENT WASTEWATER FLOWS AT THE HAMMOND-WOOD WWTP



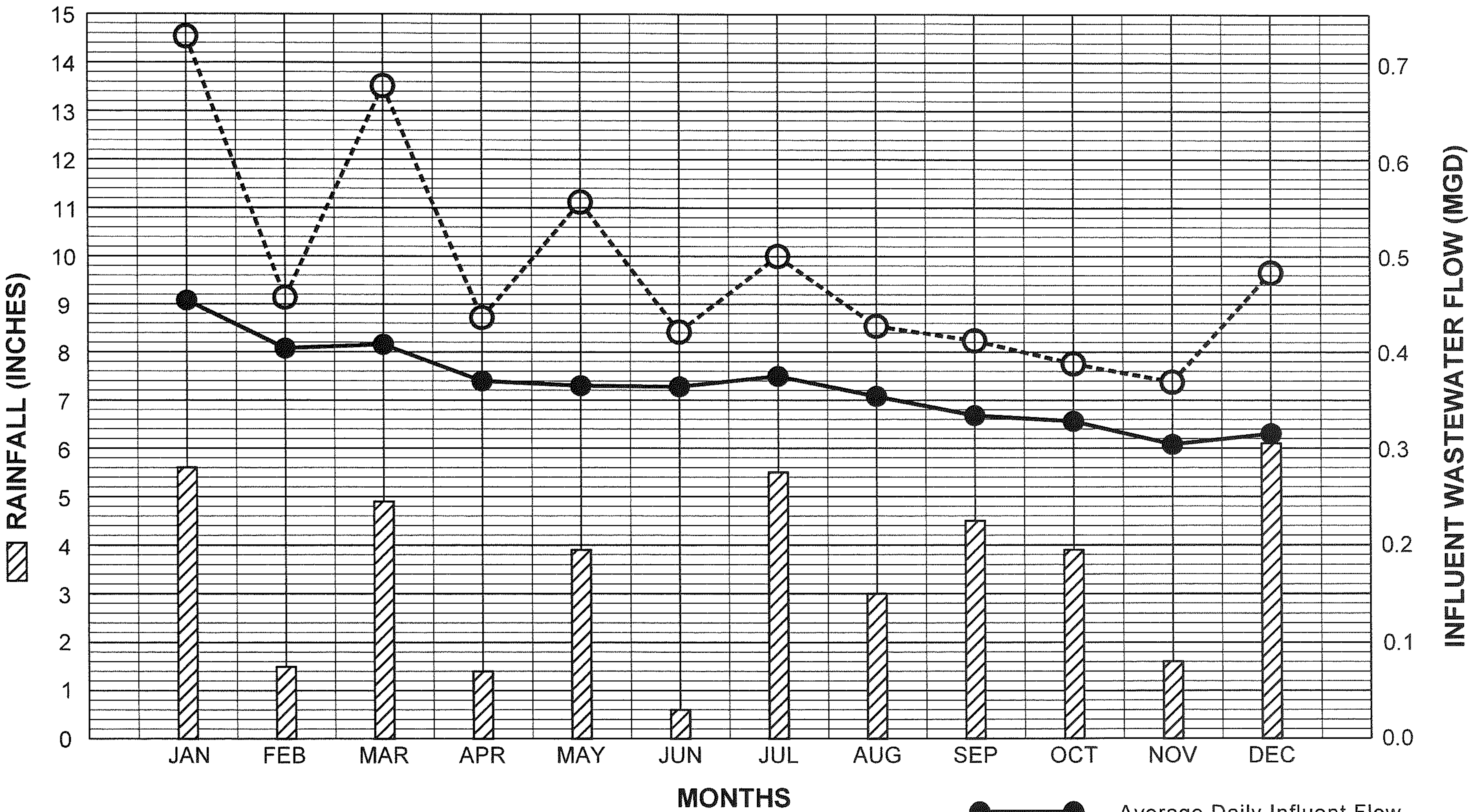
Rainfall: KY Official Source For Weather Climate Data: Kentucky Mesonet.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Northside WWTP And Hammond-Wood WWTP

FIGURE 4

2012

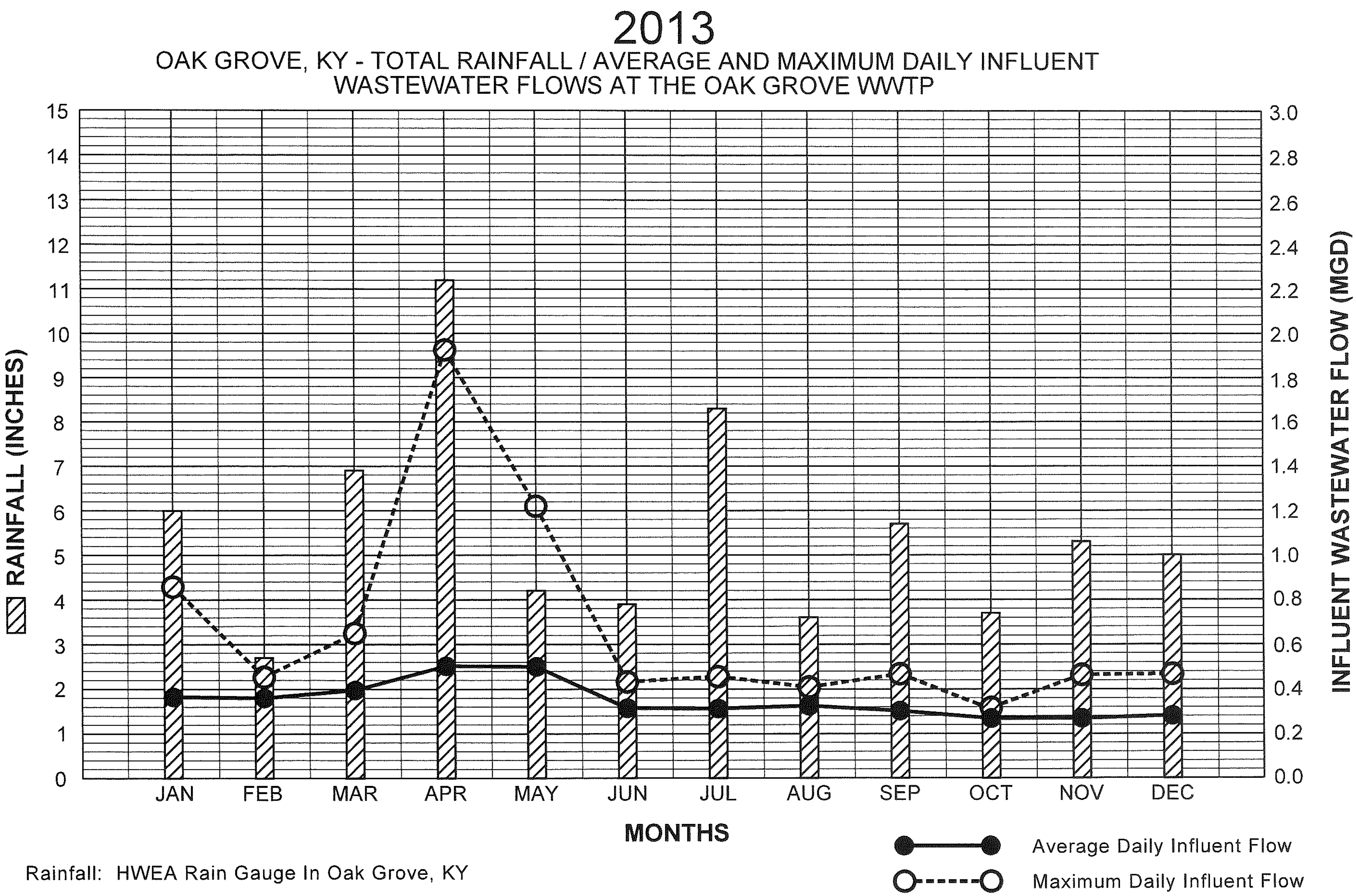
OAK GROVE, KY - TOTAL RAINFALL / AVERAGE AND MAXIMUM DAILY INFLUENT WASTEWATER FLOWS AT THE OAK GROVE WWTP



Rainfall: HWEA Rain Gauge In Oak Grove, KY.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Oak Grove WWTP

FIGURE 5



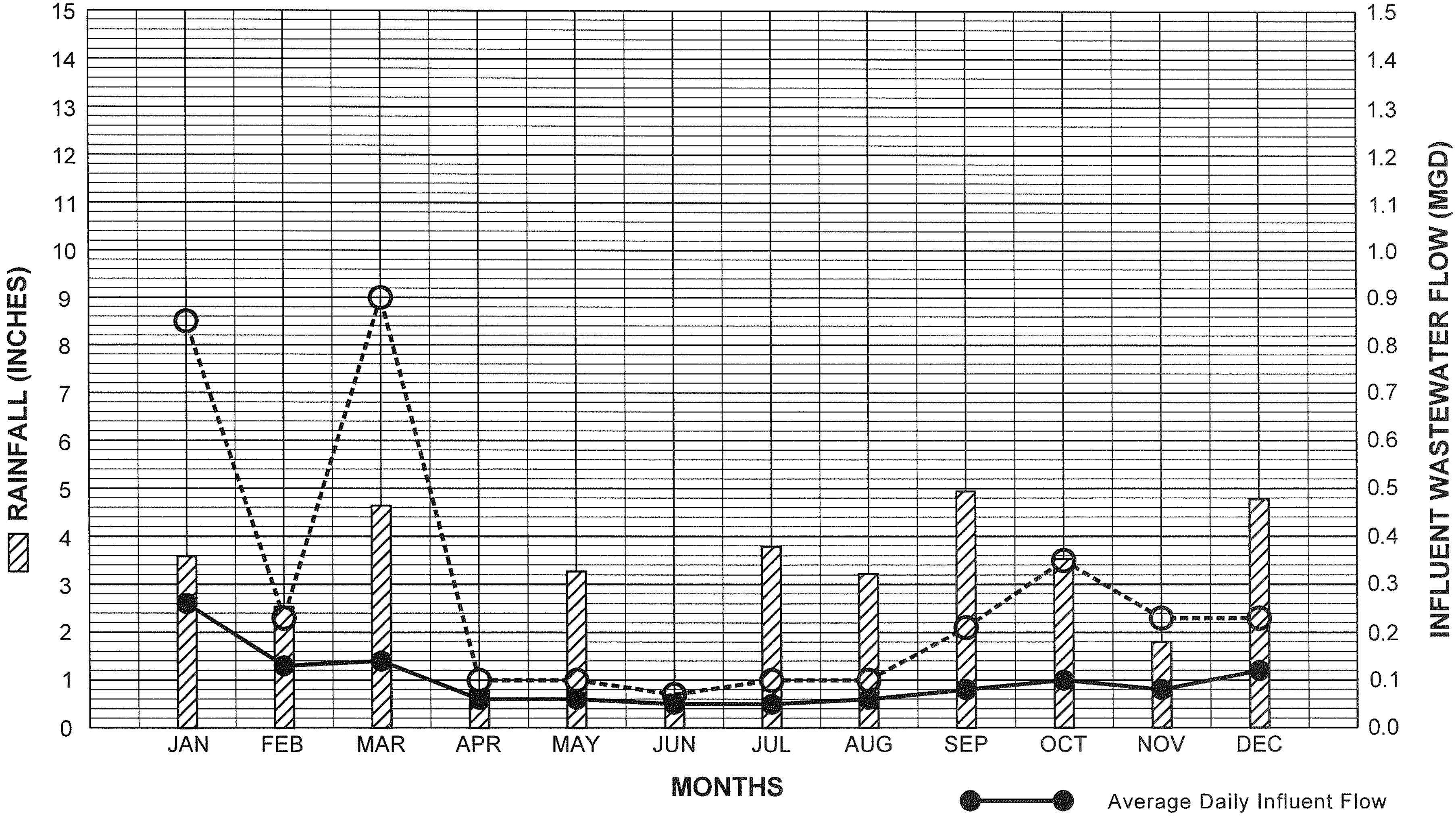
Rainfall: HWEA Rain Gauge In Oak Grove, KY

Influent Wastewater Flows: HWEA Monthly Operating Reports For The The Oak Grove WWTP

FIGURE 6

2012

HOPKINSVILLE, KY - TOTAL RAINFALL / AVERAGE AND MAXIMUM DAILY INFLUENT WASTEWATER FLOWS AT THE CROFTON WWTP



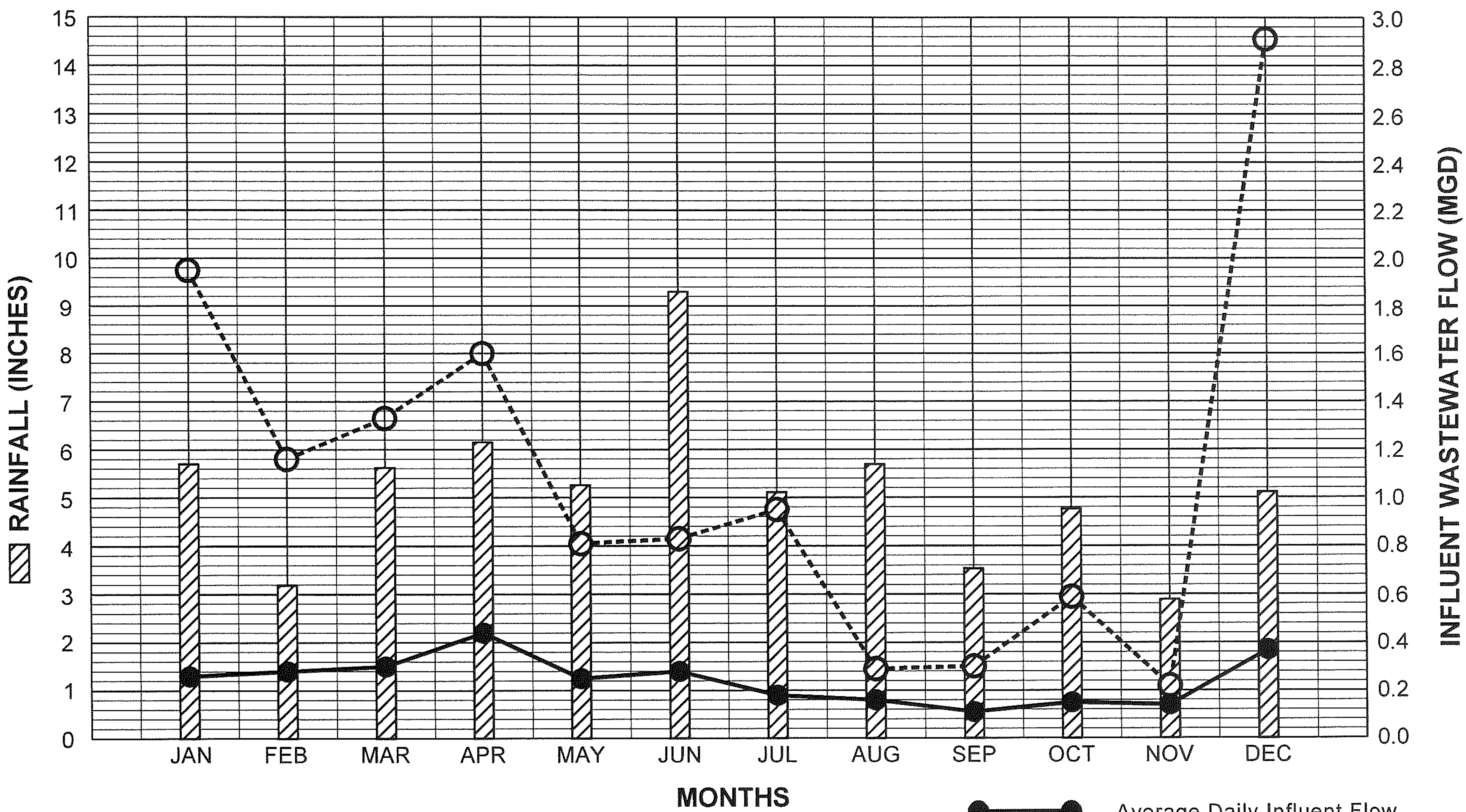
Rainfall: KY Official Source For Weather Climate Data: Kentucky Mesonet.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Crofton WWTP

FIGURE 7

2013

HOPKINSVILLE, KY - TOTAL RAINFALL / AVERAGE AND MAXIMUM DAILY INFLUENT WASTEWATER FLOWS AT THE CROFTON WWTP



Rainfall: KY Official Source For Weather Climate Data: Kentucky Mesonet.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Crofton WWTP

FIGURE 8

daily flows were disproportionately higher than other months with more total rainfall. Also, the magnitude and occurrence of each rainfall event in the month can have a significant impact on the resulting average daily and maximum daily influent flows. A large number of small rainfall events will typically have less impact on the wastewater treatment plant influent flows than a few consecutive high rainfall events.

D. Single Rainfall Events and Resulting WWTP Daily Influent Flows

In order to further assess and quantify the issue of infiltration or inflow into a sewer collection system, the single rainfall events and the resulting wastewater treatment plant influent flows were reviewed. It was determined earlier in this assessment that the City of Hopkinsville "has a slight problem with excessive infiltration and a moderate problem with excessive inflow", and the City of Crofton "has a serious problem with both excessive infiltration and excessive inflow", this rainfall event assessment will highlight single rainfall events in each City, to further assess their impact on infiltration and inflow. Oak Grove is also included in this secondary review, since its inflow is very close to the KDOW defined limit.

On December 21, 2013, the City of Hopkinsville experienced a rainfall event that was the second largest recorded rainfall for a single day in 2013. That recorded rainfall amount was 2.91 inches. Table No. 1 hereinbefore shows that for the month of December, the average daily influent flow at the Hammond Wood WWTP was 4.72 MGD. The influent wastewater flow recorded at the Hammond Wood WWTP on December 21st was 12.45 MGD, an increase in flow of 165% over the average daily influent flow for the month. The rainfall and corresponding influent wastewater flows are plotted together on the graph shown in Figure 9, for this period of December 19-27, to show the response time relationship of infiltration/inflow and influent wastewater flows created by a significant rainfall event.

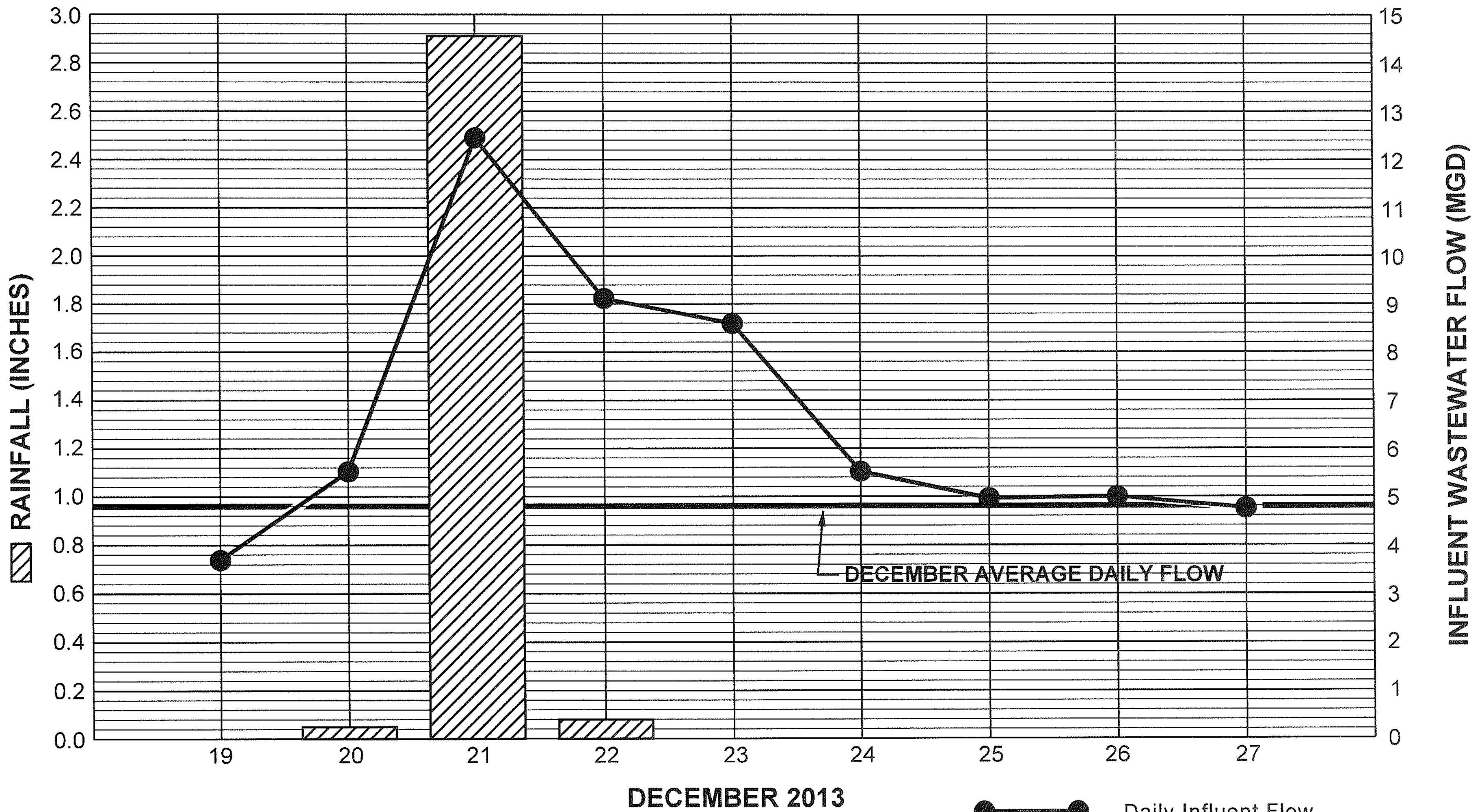
Figure 9 also shows that the daily WWTP influent flows peaked on the day of the significant rainfall event and remained above the average daily flow for the month of December for another six consecutive days, despite no additional appreciable rainfall. This is a strong indication of the magnitude of inflow and infiltration present in the Hammond Wood WWTP service area. HWEA personnel accounts of the raw sewage entering the Northside Sewage Pump Station during a rainfall event, which pumps to the Hammond Wood WWTP, states that the station influent becomes a muddy color very quickly after a significant rainfall event begins; a color identical to the adjacent North Fork Little River. These visual accounts are an indication of a significant and immediate inflow issue, one typically caused by missing manhole frames and covers of manholes located within floodplain elevations.

For the City of Oak Grove, the month of April 2013 had a two-day rainfall event on the 27th and 28th; the total rainfall on the 28th being the largest recorded rainfall event for a single day in 2013. The recorded rainfall amounts were 1.1 inches on the 27th and 4.2 inches on the 28th. The resulting infiltration and inflow from these consecutive rainfall events extended into the first three days of May. Table No. 2 hereinbefore shows that for those months of April and May, the average daily influent flow at the Oak Grove WWTP was 0.50 MGD. The influent wastewater flow recorded at the Oak Grove WWTP on April 30th was 1.93 MGD, an increase in flow of 286% over the average daily influent flow for the month. The rainfall and corresponding influent wastewater flows are plotted together on the graph shown in Figure 10, for this period of April 25th to May 3rd, to show the response time relationship of inflow and infiltration to influent wastewater flows, created by a significant rainfall event.

Figure 10 shows that the WWTP daily influent flows peaked two days after the significant rainfall event and remained above the average daily flow of 0.50 MGD for the months of April and May for another two consecutive

2013

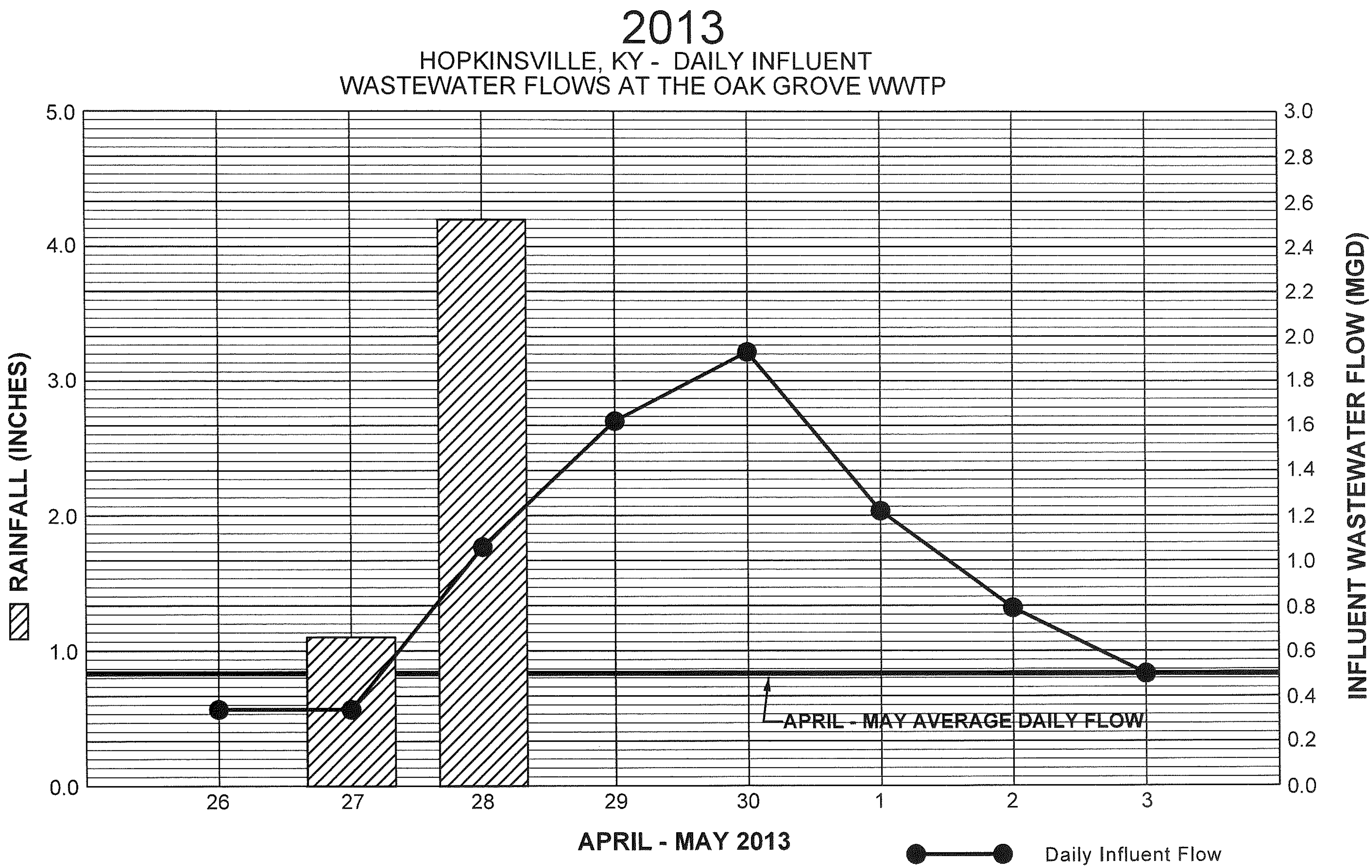
HOPKINSVILLE, KY - TOTAL RAINFALL AND DAILY INFLUENT WASTEWATER FLOWS AT THE HAMMOND-WOOD WWTP



Rainfall: KY Official Source For Weather Climate Data: Kentucky Mesonet.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Hammond-Wood WWTP

FIGURE 9



Rainfall: HWEA Rain Gauge In Oak Grove, KY.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Oak Grove WWTP

FIGURE 10

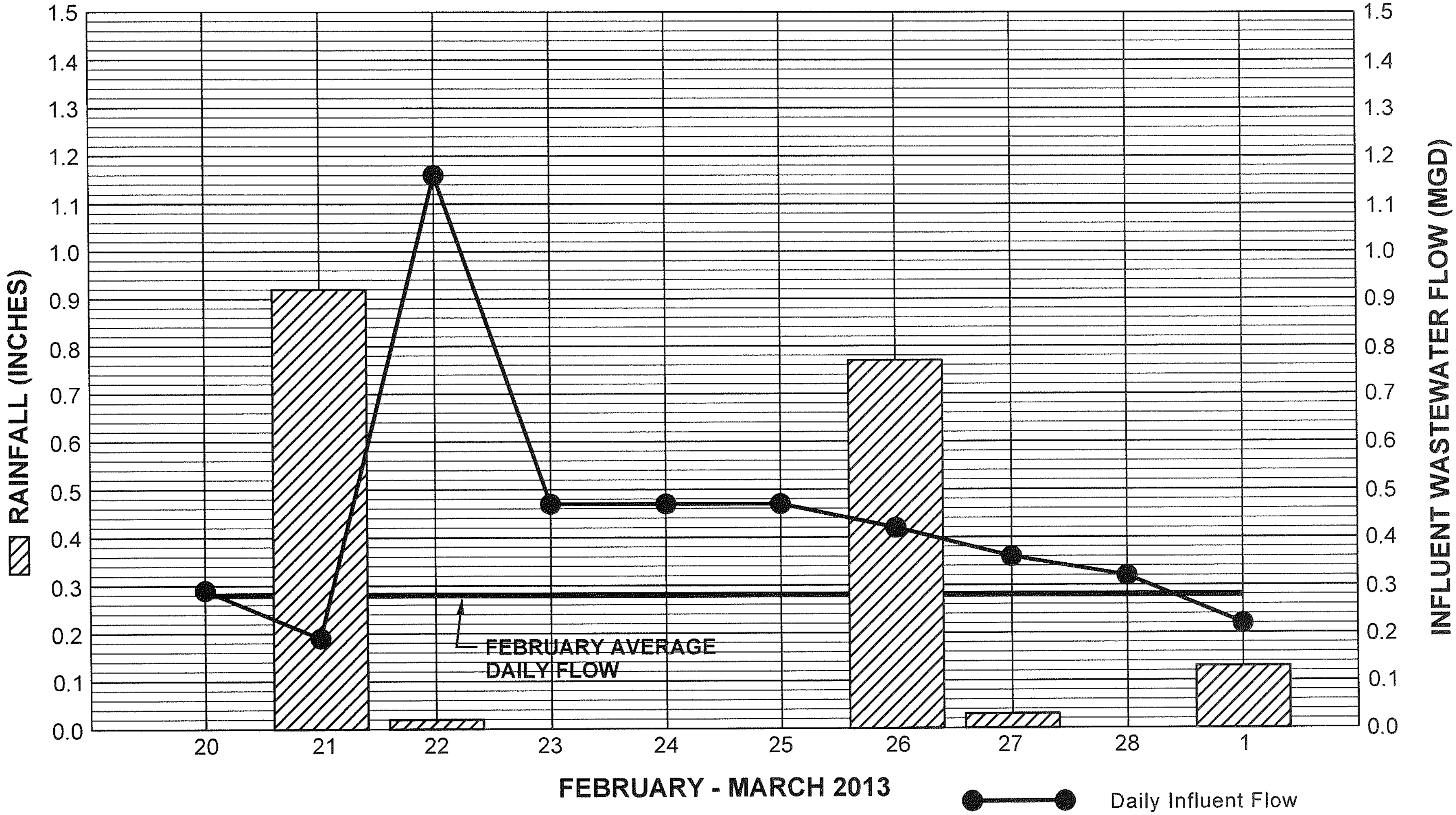
days, despite no other measured rainfall. This is also a strong indication of inflow and infiltration present in the Oak Grove WWTP service area, although not yet considered excessive by KDOW definition. What is interesting about the graph in Figure 10 is the fact that the WWTP influent flow peaked two days after the significant rainfall event. This delayed, peaked response is typically indicative of the presence of infiltration, instead of inflow, but rising water levels in rivers, creeks, lake and ponds, and rainfall runoff from impervious surfaces can create an inflow to the sewer collection system, that lasts for a few days after the rainfall event.

For the City of Crofton, the month of February 2013 had moderate rainfall events on the 21st and 26th. The recorded rainfall amount was 0.92 inches on the 21st and 0.77 inches on the 26th. Table No. 3 hereinbefore shows that for the month of February and March, the average daily influent flows at the Crofton WWTP were 0.28 MGD and 0.30 MGD, respectively. The influent wastewater flow recorded at the Crofton WWTP on February 22nd was 1.16 MGD, an increase in flow of 510% over the previous day's influent flow and 315% over the average daily influent flow for the month. The rainfall and corresponding influent wastewater flows are plotted together on the graph shown in Figure 11, for this period of February 20th to March 1st, to show the response time relationship of inflow and infiltration to influent wastewater flows, created by these moderate rainfall events.

Figure 11 shows that the WWTP daily influent flow peaked one day after the February 21st rainfall event and remained above the February average daily flow of 0.28 MGD for another three consecutive days, despite no other measured rainfall. Interestingly, Figure 11 also shows that the WWTP influent flows continued on a downward trend from the peak flow on the 22nd, even though a 0.77-inch rainfall fell on the 26th. The response time relationship of inflow and infiltration to WWTP influent flows was typical in the rainfall event of February 21st, but atypical for the rainfall event of February 26th. This relationship of the February 21st rainfall and the

2013

HOPKINSVILLE, KY - DAILY INFLUENT WASTEWATER FLOWS AT THE CROFTON WWTP



Rainfall: KY Official Source For Weather Climate Data: Kentucky Mesonet.

Influent Wastewater Flows: HWEA Monthly Operating Reports For The Crofton WWTP

FIGURE 11

resulting WWTP influent flows, displayed in Figure 11, is an indication of inflow and infiltration present in the Crofton WWTP service area, both considered excessive by KDOW definition.

Table No. 3 hereinbefore notes a measured WWTP influent flow of 0.47 MGD for February 23, 24 and 25. Table No. 3 also shows days of the same measured WWTP influent flows, for a range of 3-9 consecutive days for every month of 2013. These readings may be the result of a faulty flow meter at the Crofton WWTP. It is recommended that HWEA confirm the accuracy of the meter through calibration or some other means, to insure the dependency of the recorded influent flow information.

E. Inflow and Infiltration Reduction Strategies

The 2001 Facilities Plan Update concluded its inflow and infiltration analysis with a “recommendation that HWEA pursue an aggressive Sewer System Evaluation Study (SSES)”. The recommendation of this Regional Facility Plan is the same. The data shown in the tables and graphs herein are proof of the inflow and infiltration, directly resulting from rainfall events, that eventually enters the wastewater treatment plants of Hopkinsville, Oak Grove and Crofton. The decision to find and remove these flows in different areas of the sewer collection system is usually the result of a detailed sewer system evaluation study with an associated cost analysis. The cost analysis shows if it is more cost-efficient to transport and treat the inflow and/or infiltration, or remove the rainfall related flows, by means of stopping their pathway into the collection system. Figure 12, included herein, is a modified duplication of a figure presented in the 2001 Facilities Plan Update. It is a block diagram, showing the different steps to locate and determine the cost feasibility of removing the inflow and infiltration entering the collection system, an engineering approach to inflow and infiltration reduction.

The engineering approach to inflow and infiltration reduction begins with the proper planning of the effort to locate the routes and pathways inflow and

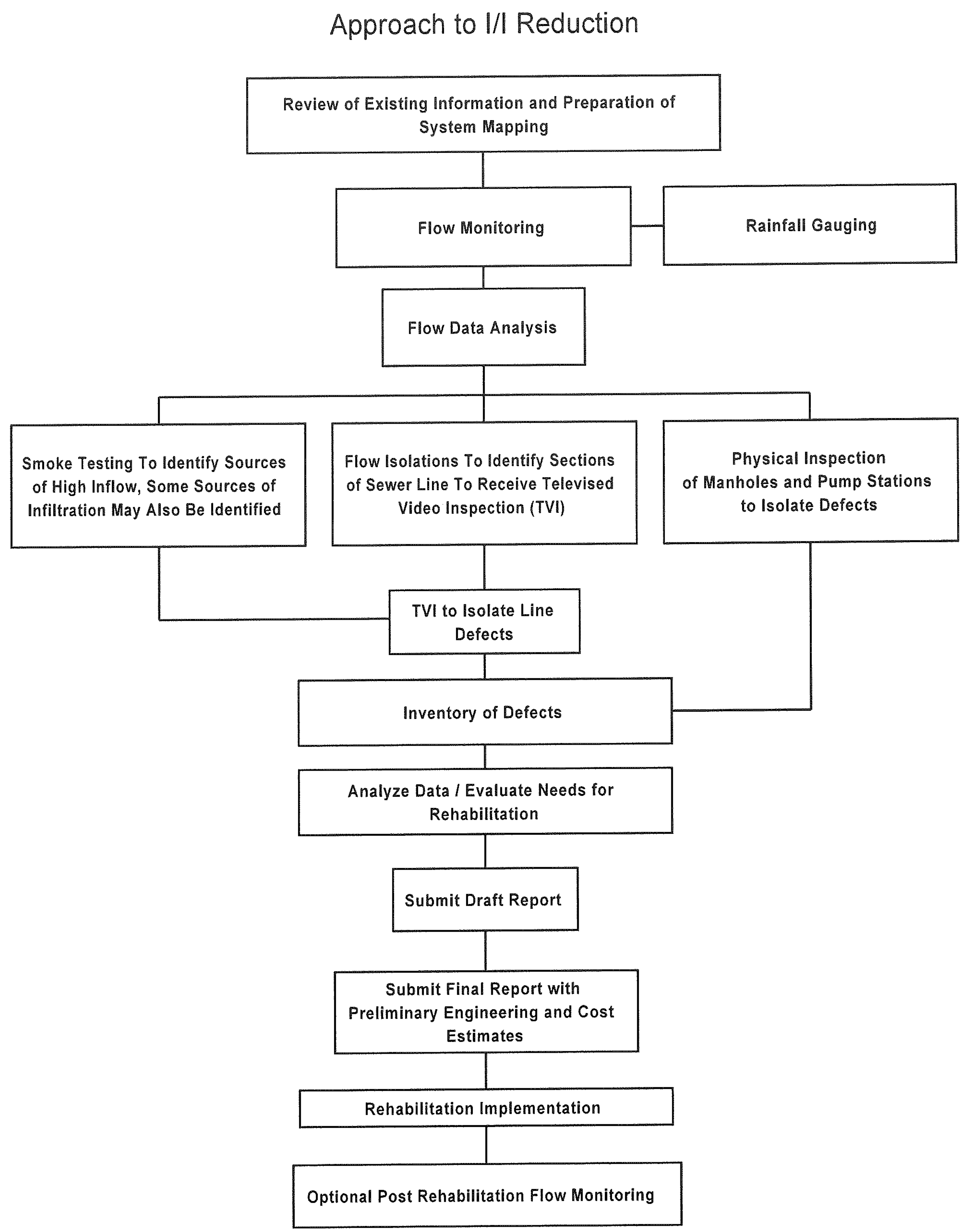

Approach to I/I Reduction
Review of Existing Information and Preparation of System Mapping
Flow Monitoring
Rainfall Gauging
Flow Data Analysis
Smoke Testing To Identify Sources of High Inflow, Some Sources of Infiltration May Also Be Identified
Flow Isolations To Identify Sections of Sewer Line To Receive Televised Video Inspection (TVI)
Physical Inspection of Manholes and Pump Stations to Isolate Defects
TVI to Isolate Line Defects
Inventory of Defects
Analyze Data / Evaluate Needs for Rehabilitation
Submit Draft Report
Submit Final Report with Preliminary Engineering and Cost Estimates
Rehabilitation Implementation
Optional Post Rehabilitation Flow Monitoring

FIGURE 12

infiltration enters the sewer collection system. Sewer collection system maps and monitored flow and rainfall data are used to strategize an approach to locating the I/I routes into the system. These potential routes are subjected to various means to confirm their locations, including smoke testing, televised video inspections and physical, visual inspections. These inspections identify and isolate the deficiencies of the collection system, allowing an inventory of defects to be developed. The defects are then analyzed and evaluated for rehabilitation. A detailed cost analysis is then performed to help determine the cost to benefit of correcting the defects. The defects which can be removed cost-effectively are then presented in engineered plans for bid and construction correction. It is recommended to utilize flow monitoring after completion of the project, to confirm the results of the inflow and infiltration reduction effort.

It is also recommended, should HWEA decide to pursue an SSES, that they cross-reference the findings of the "*Sewer System Overflow Plan (SSOP)*", which is part of this Regional Facility Plan, with the SSES, to assist with identifying the sewer collection system facilities that are experiencing high volumes of rainfall related sewage flows.

Appendix C

Waste Allocation Letter from Kentucky Division of Water

STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

RECEIVED APR 28 2014

MSG

April 25, 2014

J. Gregory Davenport, P.E.
Senior Vice President
J. R. Wauford & Company,
Consulting Engineers, Incorporated
2835 Lebanon Road
P.O. Box 140350
Nashville, Tennessee 37214

Re: Waste Load Allocation Request
Hammond Wood Wastewater Treatment Plant
Hopkinsville Water Environment Authority
KPDES No.: KY0066532
Christian County, Kentucky

Dear Mr. Davenport:

This is in response to your April 7, 2014 letter (attached), requesting a waste load allocation (WLA) for expansion of the subject wastewater treatment plant (WWTP) from 6.0 MGD to 12.0 MGD. Discharge is to remain to River Mile (RM) 61.3 (approximately National Hydrography Dataset (NHD) RM 0.45) of the North Fork Little River, segment 20013. The requested WLA information will be utilized in drafting a Regional Wastewater Facilities Plan update.

The division notes that the North Fork Little River (NHD RM 0.3 to 7.0) is included on the 2010 303(d) List of impaired waters. The impaired use listed is warm water aquatic habitat (partial support). The pollutants of concern are: nutrient/eutrophication biological indicators, organic enrichment (sewage) biological indicators, and sedimentation/siltation. The suspected sources are: agriculture and municipal point source discharges. State and Federal regulations allow new or expanded discharges into impaired waters only if the discharge will improve, or at least not contribute, to existing impairments. Discharge from an expanded and renovated WWTP, in compliance with applicable Kentucky Pollutant Discharge Elimination System (KPDES) permit limitations and requirements, would help facilitate an improvement in water quality, and could thus be approved.

Considering the above-mentioned information, applicable effluent limitations are provided below.

Design Capacity = 12.0 MGD / Discharge near NHD RM 0.45 of North Fork Little River

Parameter	May 1 - October 31	November 1 - April 30
$CBOD_5$	10 mg/l	10 mg/l
Total Suspended Solids	30 mg/l	30 mg/l
Ammonia Nitrogen	2 mg/l	5 mg/l
Dissolved Oxygen	7 mg/l	7 mg/l
Total Phosphorus	1 mg/l	1 mg/l
Total Nitrogen	Monitor, mg/l	Monitor, mg/l
Total Residual Chlorine	0.019 mg/l	0.019 mg/l

Reliability Classification = Grade C

In addition to the above requirements, the monthly average and weekly maximum values of E. coli shall be at or below 130 colonies per 100 milliliters or 240 colonies per 100 milliliters, respectively, the year around. If a form of chlorine is proposed to disinfect the wastewater, then de-chlorination will likely be needed to achieve the chlorine residual effluent concentration. Additional effluent limitations and water quality standards are contained in 401 KAR Chapter 5 and 401 KAR Chapter 10.

These preliminary design effluent limitations are valid for one (1) year from the date of this letter, and are subject to change as a result of additional information which may be presented during the public notice phase of the KPDES permitting process. As such, this letter does not convey any authorization or approval to proceed with the construction or operation of the proposed WWTP. Construction and KPDES permit applications must be submitted to request such authorization or approval. Nor does this letter ensure issuance of either permit. During the review processes of these permits the Division of Water will further evaluate the viability of the project.

Should you have any questions regarding this letter, please contact me at (502) 564-3410, extension 4914 or E-mail at Courtney.Seitz@ky.gov.

Sincerely,

Courtney Seitz

Courtney Seitz, WLA Coordinator
Wet Weather Section
Surface Water Permits Branch
Division of Water

CS:cs
c: Cindy McDonald, Water Infrastructure Branch
Compliance and Technical Assistance
Branch, Madisonville Section
TEMPO

J. R. WAUFORD & COMPANY
Consulting Engineers
2835 LEBANON ROAD - P.O. BOX 140350 • (615) 883-3243 • FAX NO. (615) 391-3710
NASHVILLE, TENNESSEE 37214

April 7, 2014

RECEIVED
APR 09 2014
SWPB

Mr. Courtney Seitz
WLA Coordinator
Wet Weather Section
Surface Water Permits Branch
Kentucky Division of Water
200 Fair Oaks Lane, 4th Floor
Frankfort, Kentucky 40601

RE: Waste Load Allocation Request Letter
Hammond Wood Wastewater Treatment Plant
Hopkinsville Water Environment Authority
Hopkinsville, Kentucky
JRWCO Job No. 1983

Dear Mr. Seitz:

The Hopkinsville Water Environment Authority (HWEA) has contracted with our firm to provide environmental engineering services for the subject project relative to the preparation of the 201 Facility Plan required to receive State Revolving Loan funding through the Kentucky Infrastructure Authority. The Hammond Wood Wastewater Treatment Plant (HWWWTP) discharges to River Mile 61.3 of the North Fork Little River (latitude/longitude 36.804970; -87.514602) and is regulated by Kentucky Discharge Elimination System (KPDES) Permit No. KY0066532.

The proposed work at the HWWWTP consists of expanding the biological treatment capacity of the plant in accordance with the following flows and waste loads:

	Summer 2013	Winter 2013	Summer 2035	Winter 2035
Flow	4.97	8.26	5.96	9.91

The basis for estimating future flows consists of using the population forecast of the Kentucky State Data Center for Christian County which indicates a year 2015 population of 75,962 and a year 2035 population of 82,091 yielding an 8.1 percent growth rate. Other factors impact growth such as assumption of nearby wastewater treatment plants and industrial development. In order to allow excess capacity for the unforeseen growth concerns, we used a minimum waste load increase of 20 percent which allows an approximate 12 percent additional capacity in excess of population growth. The design of the plant is planned to allow for easy future expansion to 12.0 MGD by constructing an additional oxidation ditch and final clarifier without further unit process or pipeline expansion.

Also enclosed you will find a USGS 7.5 minute topographic map with the projected service area, HWWWTP location, and the discharge point shown.

Please do not hesitate to contact me if you have questions

Yours very truly,

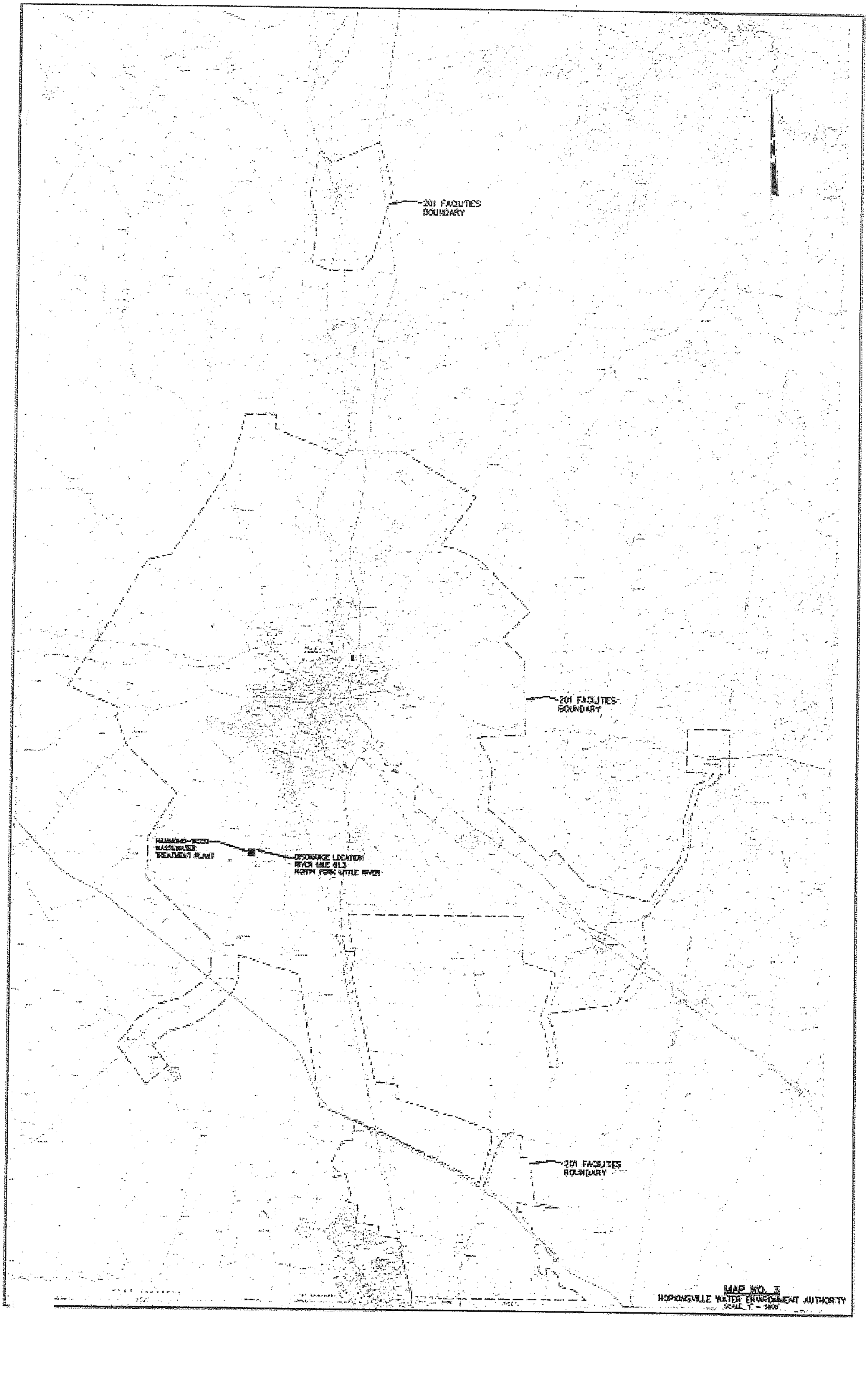
J. R. WAUFORD & COMPANY,
CONSULTING ENGINEERS, INC.

J. Gregory Davenport, P. E.
Senior Vice President

JGD:lan

Enclosures

cc: Jenny Moss, Director of Water & Wastewater - HWEA


201 FACILITIES BOUNDARY
201 FACILITIES BOUNDARY
DISCHARGE LOCATION
NORTH FORK LITTLE RIVER
201 FACILITIES BOUNDARY
MAP NO. 3
HOPKINSVILLE WATER ENVIRONMENT AUTHORITY

Appendix D

Excerpt from 2012 303(d) List

Stream Name	County	River Miles	Pollutant
Fern Cr. into Northern Ditch	Jefferson	4.4 to 5.9	Nutrient/Eutrophication Biological Indicators
Fern Cr. into Northern Ditch	Jefferson	4.4 to 5.9	Organic Enrichment (Sewage) Biological Indicators
Northern Ditch into Southern Ditch	Jefferson	0.0 to 7.3	Ammonia (unionized)
Northern Ditch into Southern Ditch	Jefferson	0.0 to 7.3	Nutrient/Eutrophication Biological Indicators
Northern Ditch into Southern Ditch	Jefferson	0.0 to 7.3	Organic Enrichment (Sewage) Biological Indicators

KDOW completed monitoring in 2005. KDOW will pursue development of these TMDLs when nutrient targets are available.

4.3 Tennessee-Mississippi-Cumberland Basin Unit

4.3.1 Lower Cumberland River Basin

4.3.1.1 Elk Fork

Stream Name	County	River Miles	Pollutant
Elk Fork into Red River	Todd	22.3 to 31.1	Fecal Coliform
Elk Fork into Red River	Todd	22.3 to 31.1	Organic Enrichment (Sewage) Biological Indicators
Elk Fork into Red River	Todd	22.3 to 31.1	Nutrient/Eutrophication Biological Indicators
Elk Fork into Red River	Todd	22.3 to 31.1	Cause Unknown

KDOW completed monitoring in 2008. KDOW will pursue development of the nutrient TMDL when nutrient targets are available.

4.3.1.2 Little River Watershed

Stream Name	County	River Miles	Pollutant
Little River into Cumberland River	Trigg	20.6 to 30.0	Nitrate/Nitrite (Nitrite + Nitrate as N)
Little River into Cumberland River	Trigg	20.6 to 30.0	Phosphorus (Total)
Little River into Cumberland River	Trigg	20.6 to 30.0	Sedimentation/Siltation

Stream Name	County	River Miles	Pollutant
Little River into Cumberland River	Trigg	30.0 to 31.4	Nutrient/Eutrophication Biological Indicators
Little River into Cumberland River	Trigg	30.0 to 31.4	Sedimentation/Siltation
Little River into Cumberland River	Trigg	31.4 to 45.5	Nutrient/Eutrophication Biological Indicators
Little River into Cumberland River	Trigg	31.4 to 45.5	Organic Enrichment (Sewage) Biological Indicators
Little River into Cumberland River	Trigg	31.4 to 45.5	Sedimentation/Siltation
Little River into Cumberland River	Christian	45.5 to 57.7	Nutrient/Eutrophication Biological Indicators
Little River into Cumberland River	Christian	45.5 to 57.7	Organic Enrichment (Sewage) Biological Indicators
Little River into Cumberland River	Christian	45.5 to 57.7	Sedimentation/Siltation
N. Fork Little River into Little River	Christian	0.0 to 0.3	Nutrient/Eutrophication Biological Indicators
N. Fork Little River into Little River	Christian	0.0 to 0.3	Organic Enrichment (Sewage) Biological Indicators
N. Fork Little River into Little River	Christian	0.0 to 0.3	Sedimentation/Siltation
N. Fork Little River into Little River	Christian	0.3 to 7.0	Nutrient/Eutrophication Biological Indicators
N. Fork Little River into Little River	Christian	0.3 to 7.0	Organic Enrichment (Sewage) Biological Indicators
N. Fork Little River into Little River	Christian	0.3 to 7.0	Sedimentation/Siltation
N. Fork Little River into Little River	Christian	7.0 to 10.9	Nutrient/Eutrophication Biological Indicators
N. Fork Little River into Little River	Christian	7.0 to 10.9	Organic Enrichment (Sewage) Biological Indicators
N. Fork Little River into Little River	Christian	7.0 to 10.9	Sedimentation/Siltation
N. Fork Little River into Little River	Christian	10.9 to 16.2	Nutrient/Eutrophication Biological Indicators
N. Fork Little River into Little River	Christian	10.9 to 16.2	Organic Enrichment (Sewage) Biological Indicators
N. Fork Little River into Little River	Christian	10.9 to 16.2	Sedimentation/Siltation
Sinking Fork into Little River	Trigg	2.2 to 5.6	Sedimentation/Siltation
Skinner Creek into Casey Creek	Trigg	0.0 to 5.8	Cause Unknown
S. Fork Little River into Little River	Christian	0.0 to 10.3	Nutrient/Eutrophication Biological Indicators
S. Fork Little River into Little River	Christian	0.0 to 10.3	Other
S. Fork Little River into Little River	Christian	0.0 to 10.3	Sedimentation/Siltation
S. Fork Little River into Little River	Christian	10.3 to 20.3	Sedimentation/Siltation
S. Fork Little River into Little River	Christian	10.3 to 20.3	Nutrient/Eutrophication Biological Indicators

Stream Name	County	River Miles	Pollutant
S. Fork Little River into Little River	Christian	10.3 to 20.3	Other

KDOW received 319(h) funding for sample collection and TMDL development in the Little River Watershed above Lake Barkley and the data collection was completed in 2002. Additional biological data were collected by KDOW in 2009. The nutrient and organic enrichment TMDLs are currently under development by EPA Region 4.

4.3.1.3 Pleasant Grove Creek Watershed

Stream Name	County	River Miles	Pollutant
Pleasant Grove Creek into Red River	Logan	0.0 to 2.2	Fecal Coliform
Pleasant Grove Creek into Red River	Logan	0.0 to 2.2	Nutrient/Eutrophication Biological Indicators
Pleasant Grove Creek into Red River	Logan	0.0 to 2.2	Organic Enrichment (Sewage) Biological Indicators

KDOW completed monitoring in 2007. Additional data will be collected as part of a separate study in 2010. KDOW will pursue development of the nutrient and organic enrichment TMDLs when nutrient targets are available.

4.3.2 Mississippi River Basin

No TMDLs currently under development.

4.3.3 Ohio River Basin

4.3.3.1 Bayou Creek Watershed

Stream Name	County	River Miles	Pollutant
Bayou Creek into Ohio River	McCracken	0.5 to 11.9	Beta particles and photon emitters
Bayou Creek into Ohio River	McCracken	0.5 to 11.9	Copper
Bayou Creek into Ohio River	McCracken	0.5 to 11.9	Lead
Bayou Creek into Ohio River	McCracken	0.5 to 11.9	Mercury
Little Bayou Cr. into Bayou Cr.	McCracken	0.0 to 7.2	Beta particles and photon emitters
Little Bayou Cr. into Bayou Cr.	McCracken	0.0 to 7.2	Copper
Little Bayou Cr. into Bayou Cr	McCracken	0.0 to 7.2	Lead

Appendix E

Hammond Wood WWTP
NPDES Permit No. KY0066532

JoE

NOV 3 0 REC'D

.s E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

NOV 2 3 1998

Len Hale, General Manager
Hopkinsville Water Environment Authority
Post Office Box 628
Hopkinsville, Kentucky 42241

Re: NPDES No.: KY0066532
Hammond Wood Wastewater Treatment Plant
Christian County, Kentucky

Dear Mr. Hale:

Enclosed is the Kentucky Pollutant Discharge Elimination System (KPDES) permit for Hammond Wood Wastewater Treatment Plant. This action constitutes a final permit issuance under 401 KAR 5:075 pursuant to KRS 224.16-050.

This permit will become effective on the date indicated in the attached permit provided that no request for adjudication is granted. All provisions of the permit will be effective and enforceable in accordance with 401 KAR 5:075 unless stayed by the Hearing Officer under Sections 11 and 13.

Any demand for a hearing on the permit shall be filed in accordance with the procedures specified in KRS 224.10-420, 224.10-440, 224.10-470 and any regulations promulgated thereto. Any person aggrieved by the issuance of a permit final decision may demand a hearing pursuant to KRS 224.10-420(2) within thirty (30) days from the date of the issuance of this letter. Two copies of request for hearing should be submitted in writing to the Natural Resources and Environmental Protection Cabinet, Office of Administrative Hearings, 35-36 Fountain Place, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Division of Water, 14 Reilly Road, Frankfort, Kentucky 40601. For your record keeping purposes, it is recommended that these requests be sent by certified mail. The written request must conform to the appropriate statutes referenced above.

If you have any questions regarding the KPDES decision, please contact Ms. Judy Zeigler, Inventory and Data Management Section, KPDES Branch, at (502) 564-2225, extension 465.

Further information on procedures and legal matters pertaining to the hearing request may be obtained by contacting the Office of Administrative Hearings at (502) 564-7312.

Sincerely,

Jack A. Wilson

Jack A. Wilson, Director
Division of Water

JAW:NG:ng
Enclosure
c: *U.S. EPA Region IV*
Madisonville Regional Office

KPDES

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO.: KY0066532

AUTHORIZATION TO DISCHARGE UNDER THE
KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

Hopkinsville Water Environment Authority
P.O. Box 628
Hopkinsville, Kentucky 42241

is authorized to discharge from a facility located at

Hammond Wood Wastewater Treatment Plant
Gary Lane
Hopkinsville, Kentucky
Christian County

to receiving waters named

North Fork of Little River/61.3

in accordance with effluent limitations, monitoring requirements and other conditions set forth in PARTS I, II, III, and IV hereof. The permit consists of this cover sheet, and PART I 2 pages, PART II 4 pages, PART III 1 page, and PART IV 2 pages.

This permit shall become effective on JAN 01 1999

This permit and the authorization to discharge shall expire at midnight,

DEC 31 2003

NOV 23 1998
Date Signed

Jack A. Wilson, Director
Division of Water

Robert W. Logan
Commissioner

DEPARTMENT FOR ENVIRONMENTAL PROTECTION
Division of Water, Frankfort Office Park, 14 Reilly Road, Frankfort, Kentucky 40601

Printed on Recycled Paper

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 001, Municipal Discharge.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS lbs/day Monthly Avg.	lbs/day Weekly Avg.	Other Units (Specify) Monthly Avg.	Other Units (Specify) Weekly Avg.	MONITORING REQUIREMENTS Measurement Frequency	Sample Type	Sampling Location
Flow, Design (6.0 mgd)	N/A	N/A	Report	Report	Continuous	N/A	Influent or Effluent
Biochemical Oxygen Demand (5-day), Carbonaceous	500	750	10 mg/l 6.67	15 mg/l 10 9MGD	3/week	Composite	Influent & Effluent
Total Suspended Solids	1500	2250	30 mg/l	45 mg/l	3/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, N/100	N/A	N/A	200	400	3/week	Grab	Effluent
Ammonia (as N)	100 250	150 375	2 mg/l* 5 mg/l**	3 mg/l* 7.5 mg/l**	3/week	Composite	Influent & Effluent
Dissolved Oxygen shall not be less than 7 mg/l					3/week	Grab	Effluent
Dissolved Oxygen, In-stream	See PART I, Page I-2 for monitoring requirements					Grab	In-stream
Cadmium, Total Recoverable, mg/l	N/A	N/A	0.0019	0.0077***	See PART I, Page I-2	Composite	Effluent
Copper, Total Recoverable, mg/l	N/A	N/A	0.021	0.031***	See PART I, Page I-2	Composite	Effluent
Lead, Total Recoverable, mg/l	N/A	N/A	0.007	0.176***	See PART I, Page I-2	Composite	Effluent
Biomonitoring shall not exceed 1.06 chronic toxicity unit(s)				See PART IV, Pages IV-1 and IV-2			Effluent
Additional Parameters				See PART I, Page I-2			Effluent

In addition to the specified limits, the monthly average effluent $CBOD_5$ and suspended solids concentration shall not exceed 15% of the respective monthly average influent concentration (85% removal).
The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored three times per week by Grab sample.
There shall be no discharge of floating solids or visible foam in other than trace amounts.
The effluent shall not cause a visible sheen on the receiving water.

* Effective May 1 - October 31
** Effective November 1 - April 30
*** Daily Maximum

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (CONTINUATION)

The effluent shall be monitored for the following parameters in both the total recoverable form and the dissolved form:

lead, copper, zinc, and cadmium.

The effluent shall be monitored for hardness as calcium carbonate ($CaCO_3$).

Monitoring shall be done in conjunction with biomonitoring.

Testing for these parameters shall be conducted according to 40 CFR Part 136.

<u>In-stream Dissolved Oxygen Monitoring</u>
The receiving stream shall be monitored for dissolved oxygen once per week by grab sample during the period beginning May 1 and ending October 31 of each year. The recommended location for monitoring is the vicinity of the Highway 345 bridge crossing of the Little River at approximately 56.5 mile point. Results shall be summarized and reported on the Discharge Monitoring Reports (DMR).

B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with all requirements on the effective date of this permit.

STANDARD CONDITIONS FOR KPDES PERMIT

The permittee is also advised that all KPDES permit conditions in KPDES Regulation 401 KAR 5:065, Section 1 will apply to all discharges authorized by this permit.

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies.

It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

SPECIAL POTW REQUIREMENTS

NOTE: The following requirements apply only to Publicly-Owned Treatment Works.

SLUDGE DISPOSAL

Requirements will be imposed, as applicable, governing the disposal of sewage sludge in accordance with 401 KAR Chapters 30, 47, and 48.

PRETREATMENT

A. Program Requirements

1. The permittee shall be responsible for the performance of all pretreatment requirements contained in 401 KAR 5:057, Section 6 and pursuant to 40 CFR Part 403, and shall be subject to enforcement actions, penalties, fines, and other remedies by the state, as provided in the Clean Water Act (hereafter the "Act"). The permittee shall implement and enforce its approved POTW pretreatment program. The permittee's approved POTW pretreatment program is hereby made an enforceable condition of this permit. The state may initiate enforcement action against a POTW and against an industrial user for noncompliance with applicable standards and requirements as provided in KRS 224.16-050(1), 224.70-110, and 224.73-120, and pursuant to the Act.

2. The permittee shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d), and 402(b) of the Act. The permittee shall cause industrial users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of the discharge.

3. The permittee shall perform the pretreatment functions as required in 401 KAR 5:057, Section 6 and 40 CFR Part 403 including, but not limited to:

   a. Implement the necessary legal authorities as provided in 401 KAR 5:057, Section 6(4)(a). This includes, among other things, the authority to:

(1) Deny or condition new or increased contributions of pollutants or changes in the nature of pollutants (401 KAR 5:057, Section 6(4)(a)(1));

(2) Require compliance with applicable pretreatment standards (401 KAR 5:057, Section 6(4)(a)(2));

(3) Control through permit to ensure compliance (401 KAR 5:057, Section 6(4)(a)(3));

(4) Require the development of compliance schedules and submission of reports (401 KAR 5:057, Section 6(4)(a)(4));

(5) Carry out inspection, surveillance, and monitoring procedures (401 KAR 5:057, Section 6(4)(a)(5));

(6) Obtain remedies for noncompliance by industrial users (401 KAR 5:057, Section 6(4)(a)(6)).

b. Implement the programmatic functions as provided in 401 KAR 5:057, Section 6(4)(b). This includes:

(1) An industrial waste survey (401 KAR 5:057, Section 6(4)(b)(1 and 2));

(2) Notification of appropriate federal, state and/or local standards or limitations (401 KAR 5:057, Section 6(4)(b)(3));

(3) Receipt and analysis of self-monitoring reports and other notices, (401 KAR 5:057, Section 6(4)(b)(4));

(4) POTW compliance sampling and analysis (401 KAR 5:057, Section 6(4)(b)(5));

(5) Noncompliance investigations and enforcement (401 KAR 5:057, Section 6(4)(b)(6));

(6) Public participation (401 KAR 5:057, Section 6(4)(b)(7)).

c. Provide the required funding, equipment, and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3) and 403.9(b)(4).

4. The permittee shall adopt and enforce local limits that will protect the treatment works against interference, pass-through, and sludge contamination. Local limits shall be revised as necessary by the permittee as provided in 40 CFR 122.21 and CFR 403.5.

B. <u>Semi-Annual Reporting</u>

1. The permittee shall submit semi-annually a report to the state describing the permittee's pretreatment program activities over the previous six (6) months. In the event that the permittee is not in compliance with any conditions or requirements of this permit, then the permittee shall also include the reasons for noncompliance and state how and when the permittee shall comply with such conditions and requirements. The semi-annual reports shall cover the periods of January through June and July through December. They are due on September 1 and March 1 of each year, respectively. Each report shall contain, but not be limited to, the following information:

a. A summary of analytical results of the POTW's influent, effluent, and sludge for those pollutants identified under Section 307(a) of the Act which are known or suspected to be discharged by industrial users, and for any nonpriority pollutants which the permittee believes may be causing or contributing to interference, pass-through, or adversely impacting sludge quality. The frequency of analysis shall not exceed twelve months.

b. A discussion of upset, interference, or pass-through incidents, if any, at the POTW treatment plant which the permittee knows or suspects were caused by industrial users of the POTW system. The discussion shall include the reasons why the incidents occurred, the corrective actions taken and, if known, the name and address of the industrial user(s) responsible.

c. The cumulative number of industrial users that the permittee has notified regarding baseline monitoring reports and the cumulative number of industrial user responses.

d. An updated list of the permittee's industrial users including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The permittee shall provide a brief explanation for each deletion. The list shall identify the industrial users subject to federal categorical standards and which set(s) of standards are applicable. The permittee shall characterize the compliance status of each industrial user by employing the following descriptions:

(1) In compliance with baseline monitoring report requirements (where applicable);
(2) Consistently achieving compliance;
(3) Inconsistently achieving compliance;
(4) Significantly violated applicable pretreatment requirements as defined by 40 CFR 403.8(f)(2)(vii);
(5) On a compliance schedule to achieve compliance (include the date final compliance is required);
(6) Not achieving compliance and not on a compliance schedule;
(7) The permittee does not know the industrial user's compliance status (with explanation).

e. A summary of the inspection and sampling activities conducted by the permittee during the past six (6) months to gather information and data regarding industrial users. The summary shall include:

(1) The names of industrial users subject to surveillance by the permittee and an indication of whether they were inspected, sampled, or both and the frequency of these activities at each user; and
(2) The conclusions or results from the inspection or sampling of each industrial user.

f. A summary of the compliance and enforcement activities during the past six (6) months, the summary shall include the names of the industrial users affected by the following actions:

(1) Warning letter or notices of violation;
(2) Administrative orders;
(3) Civil actions;
(4) Criminal actions;
(5) Assessment of monetary penalties. For each industrial user identify the amount of the penalties;
(6) Restriction of flow to the POTW; or
(7) Disconnection from discharge to the POTW.

g. A description of any significant changes in operating the pretreatment program which differ from the information in the permittee's approved pretreatment program including, but not limited to changes concerning: the program's administrative structure; local industrial discharge limitations; monitoring program or monitoring frequencies; legal authority or enforcement policy; funding mechanisms; resource requirements; or staffing levels.

h. A summary of the semi-annual pretreatment budget, including the cost of pretreatment program functions and equipment purchases.

i. A summary of public participation activities to involve and inform the public. This shall include a copy of the annual publication of significant violations, if such publication was needed to comply with 40 CFR 403.8(f)(2)(vii).

j. A description of any changes in sludge disposal methods and a discussion of any concerns not described elsewhere in the report.

k. Any other information deemed as pertinent by the state in effectively administrating an approved pretreatment program.

2. A signed copy of this report shall be submitted by the due dates to the state at the address shown below:

Kentucky Department of Environmental Protection
Division of Water
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

PART III

OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained during each month must be reported on a preprinted Discharge Monitoring Report (DMR) Form which will be mailed to you. Each month's completed DMR must be sent to the Division of Water at the address listed below (with a copy to the appropriate Regional Office) postmarked no later than the 28th day of the month following the month for which monitoring results were obtained.

Division of Water
Madisonville Regional Office
625 Hospital Drive
Madisonville, Kentucky 42431-1683
Attn: Mr. Don Hayes

Kentucky Natural Resources and
Environmental Protection Cabinet
Dept. for Environmental Protection
Division of Water
Inventory & Data Management
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

B. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under 401 KAR 5:050 thru 5:080 and KRS 224, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

PART IV
CHRONIC CONCERNS
Biomonitoring

In accordance with Part I of this permit, the permittee shall initiate the series of tests described below within 30 days of the effective date of this permit to evaluate wastewater toxicity of the discharge from outfall(s) 001. If the permittee is using a most sensitive species, the initial four (4) tests shall be conducted using both test species as indicated below to provide confirmation of previously identified most sensitive test organism.

1. Test Requirements

A. The permittee shall perform one short-term fathead minnow (Pimephales promelas) growth test and one short-term daphnid (Ceriodaphnia sp.) life-cycle test. Tests shall be conducted with appropriate replicates of 94% effluent, a control and a minimum of four evenly spaced serial dilutions of 94% effluent. If the permit limit is greater than 77% (TU_c <1.3), then one dilution must be 100%. For all other conditions, two dilutions must be above the permit concentration and two below. Controls shall be tested concurrently with effluent testing using a synthetic water. The analysis will be deemed reasonable and good only if the minimum control requirements are met (i.e.≥80% survival; 60% adults with 3 broods and 15 young/female for the Ceriodaphnia test; an average 0.25 mg weight for the minnow growth test). Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period (i.e. monthly or quarterly). Noncompliance with the toxicity limit will be demonstrated if the IC_{25} (inhibition concentration) for reproduction or growth is less than 94% effluent. The average reproduction for Ceriodaphnia shall be calculated by dividing the total number of live Ceriodaphnia young in each concentration by the total number of organisms used to initiate that concentration; the average growth for the fathead minnows shall be calculated by dividing the total weight of surviving minnow larvae in each replicate by the total number of organisms used to initiate that replicate.

B. Tests shall be conducted quarterly or at a frequency to be determined by the permitting authority.

A minimum of three (3) twenty-four hour composite samples will be collected at a frequency of one sample every other day, or at a frequency to be determined by the permitting authority. For example, the first sample would be used for test initiation, day 1, and for test solution renewal on day 2. The second sample would be used for test solution renewal on days 3 and 4. The third sample would be used for test solution renewal on days 5, 6, and 7. The lapsed time from collection of the last aliquot of the composite and its first use for test initiation, or for test solution renewal shall not exceed 36 hours. Composite samples shall be chilled during collection and maintained at 4°C until used.

After the first four tests with both species, the Division will determine whether one or both organisms will be used for subsequent routine monitoring tests.

2. Reporting Requirements

Results of all tests conducted with any organism shall be reported according to the most recent format provided by the Division of Water. Test results shall be submitted to the Division of Water with the next regularly scheduled discharge monitoring report.

3. Chronic Toxicity

A. If noncompliance with the toxicity limit occurs (IC_{25} for reproduction or growth is less than 94% effluent), the permittee must conduct a second test within 15 days of the first failure. This test will be used in evaluating the persistence of the toxic event and the possible need for a toxicity reduction evaluation (TRE).

If the second test demonstrates noncompliance with the toxicity limit, the permittee will be required to perform either of the options listed below. The Division must be notified of the option selected within 5 days of the failure of this second test.

1) Accelerated Testing

Complete four (4) tests within 90 days of selection of this option to evaluate the frequency and degree of toxicity. The results of the two tests specified in Section 3.A and of the four additional tests will be used for purposes of this evaluation.

If results from 2 of any 6 tests show a significant non-compliance with the chronic limit ($\geq$1.2 times the TU_c), or results from 4 of any 6 tests show chronic toxicity (as defined in 1.A), a Toxicity Reduction Evaluation (TRE) will be required. The Division reserves the right to require a TRE in situations of recurring toxicity.

2) Toxicity Reduction Evaluation (TRE)

If it is determined that a TRE is required, a plan and implementation schedule must be submitted to the Division within 30 days of notification. The TRE shall include appropriate measures such as in-plant controls, additional wastewater treatment, or changes in the operation of the wastewater discharge to meet permit conditions. The TRE protocol shall follow that outlined in the most recent edition of EPA's guidance for conducting TRE's.

B. If a violation of the toxicity limit occurs, different or more stringent monitoring requirements may be imposed in lieu of the normal requirements of this permit for whatever period of time is specified by the Division of Water. The Division reserves the right to require additional testing or a TRE in situations of recurring toxicity.

4. Test Methods

All test organisms, procedures and quality assurance criteria used shall be in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (Second Edition), EPA/600/4-91/002, An Interpolation Estimate for Chronic Toxicity, the IC_p Approach, National Effluent Toxicity: Assessment Center, U.S. EPA, Technical Report 05-88, or the most recent edition of these publications.

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

FACT SHEET

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT TO DISCHARGE TREATED WASTEWATER INTO WATERS OF THE COMMONWEALTH

KPDES No.: KY0066532 **Permit Writer:** Herb Ray **Date:** August 07, 1998

1. **SYNOPSIS OF APPLICATION**

   a. Name and Address of Applicant

   Hopkinsville Water Environment Authority
   P.O. Box 628
   Hopkinsville, Kentucky 42241

   b. Description of Applicant's Operation

   Engaged in collection, treatment, and disposal of wastewater.

   c. Production Capacity of Facility

   6.0 MGD Hammond Wood Wastewater Treatment Plant
   Gary Lane
   Hopkinsville, Kentucky
   Christian County

   d. Description of Existing Pollution Abatement Facilities

   Treatment consists of screening, grit removal, oxidation ditch, sedimentation, ultra-violet disinfection, and post aeration. Solids handling includes aerobic digestion, thickening, filter press, and disposal by composting.

   e. Permitting Action

   This is a reissuance of a permit for a municipality.

2. **RECEIVING WATER**

   a. Name/Mile Point - North Fork of Little River/61.3

   b. Stream Segment Use Classification - Warmwater Aquatic Habitat and Primary/Secondary Contact Recreation

   c. Stream Low Flow Condition - 5.0 cfs (0.54 cfs natural drainage, the balance contributed from Hopkinsville Northside facility).

3. **REPORTED DISCHARGE & PROPOSED LIMITS**

   See Attachment

(Disk #10/jk)

4. METHODOLOGY USED IN DETERMINING LIMITATIONS

Biochemical Oxygen Demand (5-day), Total Suspended Solids, Fecal Coliform, and pH
The effluent limitations for the above permit parameters are consistent with 401 KAR 5:045, pursuant to KRS 224.70-100, 224.70-110.

Ammonia Nitrogen, Dissolved Oxygen, Cadmium, Copper, Lead and Biomonitoring
The effluent limitations for the above permit parameters are consistent with 401 KAR 5:031, pursuant to KRS 224.70-100, 224.70-110.

Sludge Management
Requirements will be imposed, as applicable, governing the disposal of sewage sludge in accordance with 401 KAR Chapters 30, 47, and 48.

Nondegradation
The conditions of 401 KAR 5:029, Section 2(1) and (3) have been satisfied by this permit action. A review under Section 2(2) and (4) is not applicable.

5. PROPOSED COMPLIANCE SCHEDULE FOR ATTAINING EFFLUENT LIMITATIONS

Permittee will comply with effluent limitations by the effective date of the permit.

6. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE

None

7. PERMIT DURATION

Five (5) years

8. THE ADMINISTRATIVE RECORD

The Administrative Record, including application, draft permit, fact sheet, public notice, comments received, and additional information is available by writing the Division of Water at 14 Reilly Road, Frankfort Office Park, Frankfort, Kentucky 40601.

9. REFERENCED AND CITED DOCUMENTS

All materials and documents referenced or cited in this fact sheet are either a part of the Administrative Record as described in Item 8 on this page or readily available at the Division of Water.

10. CONTACT

For further information contact the individual identified on the Public Notice or the Permit Writer - Herb Ray at (502) 564-2225, extension 431.

11. PUBLIC NOTICE INFORMATION

Please refer to the attached Public Notice for details regarding the procedures for a final decision, deadline for comments and other information required by 401 KAR 5:075, Section 4(2)(e).

REPORTED DISCHARGE AND PROPOSED LIMITS - Municipal

Serial Number 001

Effluent Characteristics	Reported Discharge			Proposed Limits		COMMENTS
	Average Annual Value	Lowest Monthly Value	Highest Monthly Value	Monthly Average	Weekly Average	
Flow, MGD	2.80	2.13	4.96	Design Flow = 6.0 mgd		NR - Not Required
$CBOD_5$, mg/l	2.3	1.1	4.3	10	15	
TSS, mg/l	3.44	1.5	9.0	30	45	
Fecal Coliform, N/100 ml	NR	NR	173	200	400	
Ammonia (as N) mg/l	0.99	0.08	3.67	2 5	3 7.5	Summer Winter
Dissolved Oxygen, mg/l	9.3	7.8	11.0	7 Minimum		
pH, standard units	NR	6.9	8.2	6.0 - 9.0		
Cadmium, mg/l	0.012	0.002	0.029	0.0019	0.0077*	
Copper, mg/l	0.030	0.007	0.097	0.021	0.031*	
Lead, mg/l	<0.052	<0.05	0.078	0.007	0.176*	
Biomonitoring, chronic toxicity units (TU_c)	Range <1.0 - 1.5, Avg. < 1.06**			Not to exceed 1.06 See PART IV, Pages IV-1 and IV-2		

* Daily Maximum
** Based on 1997 monitoring results

JAMES E. BICKFORD
SECRETARY

NOV 3 0 REC'D

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

NOV 2 3 1998

Len Hale, General Manager
Hopkinsville Water Environment Authority
401 East Ninth Street
P.O. Box 628
Hopkinsville, Kentucky 42241-0628

Re: Hammond Wood WWTP
NPDES No.: KY0066532
Christian County, Kentucky

Dear Mr. Hale:

Your comments concerning the above-referenced draft permit have been reviewed and responses prepared in accordance with Kentucky Pollutant Discharge Elimination System (KPDES) regulation 401 KAR 5:075, Section 12. The comments have been briefly described below and our responses to those comments follow:

COMMENT 1: Due to discrepancies between split sample analyses performed by a private lab and the wastewater treatment facility lab, which consistently indicate higher results from the treatment facility lab, it is requested that a monitor only condition for metals be required for the first year using the independent lab, evaluate the results and apply limits, if necessary at that time.

RESPONSE 1: The Division acknowledges the discrepancy in lab results and will maintain a monitor only requirement for the metals of concern. In addition, we would not only like to see the independent lab retained for metals analyses for one year, but on a permanent basis, or HWEA purchase the necessary equipment to analyze at the appropriate levels to allow effective correlation to applicable criteria.

COMMENT 2: Limitations for cadmium, copper and lead do not appear to have been adjusted for stream dilution availability.

RESPONSE 2: The limits were adjusted by the same amount as the toxicity limit. Depending on the criteria, this can amount to a minute increase.

COMMENT 3: The toxicity limit should be calculated utilizing the entire stream flow, including the Northside WWTP effluent, and not just the portion contributed by natural runoff. Hopkinsville Water Environment Authority (HWEA) requests the opportunity to convince the Division of Water the entire stream flow should be used in the calculations for toxicity.

RESPONSE 3: The Division will consider a proposal by HWEA for revision of the allowable stream flow dilution. Such a proposal will have to be coordinated with Division personnel to ensure the proper analyses and data collection is provided. Based on the results of the study, the permit may be appropriately modified.

COMMENT 4: Toxicity limit, if retained, should apply to in-stream rather than effluent samples.

RESPONSE 4: While it is true prevention of in-stream toxicity is the ultimate goal, it is the wastewater treatment facility that is being permitted. The permit is designed with conditions to protect the receiving stream. It is through monitoring of the effluent of the treatment facility that we, as the regulatory authority, can ensure the effluent will meet the necessary requirements prior to mixing with the stream. In-stream assessments can be important sources of information used in conjunction with whole effluent toxicity (WET) data, but by itself provides an inadequate measure of protection as is the purpose of the discharge permit.

Any demand for a hearing on the response to comments shall be filed in accordance with the procedures specified in KRS 224.10-420, 224.10-440, 224.10-470 and any regulations promulgated thereto. Any person aggrieved by the issuance of a permit final decision may demand a hearing pursuant to KRS 224.10-420(2) within thirty (30) days from the date of the issuance of this letter. Two copies of request for hearing should be submitted in writing to the Natural Resources and Environmental Protection Cabinet, Office of Administrative Hearings, 35-36 Fountain Place, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Division of Water, 14 Reilly Road, Frankfort, Kentucky 40601. For your record keeping purposes, it is recommended that these requests be sent by certified mail. The written request must conform to the appropriate statutes referenced above.

If you have any questions regarding these responses, please contact Herb Ray, KPDES Branch, at (502) 564-2225, extension 431.

Further information on procedures and legal matters pertaining to the hearing request may be obtained by contacting the Office of Administrative Hearings at (502) 564-7312.

Sincerely,

Jack A. Wilson, Director
Division of Water

JAW:HR:vb

c: Division of Water Files

REPORT TO FILES

TELECOM WITH HERB RAY, DOW
HAMMOND-WOOD WWTP KPDES PERMIT

December 3, 1998

I called Herb to discuss his letter of November 23, 1998 responding to my comments on the draft KPDES permit issued by the DOW for the Hammond-Wood WWTP.

- His response letter said that they would agree to "monitor only" for Cd, Pb, and Cu, but the final permit still has limits. He said that the staff thought it best not to try and change the permit (which would require a new draft permit and public notice). Instead they will issue DMR forms listing "monitor only" for these parameters.
- I asked him how to go about preparing a report to consider the flows contributed by Northside for the calculation of limits for Hammond-Wood. He said that our consultant should discuss their ideas with the DOW biomonitoring staff (Charlie Roth), before deciding on a proposal to be submitted to the DOW.
- I told him that the preprinted DMR forms for Hammond-Wood WWTP listed the toxicity limit as 1.02 instead of the permitted value of 1.1 (which will be changed to 1.06 under the new permit). He didn't want us to mark through the limit and change it, but he wanted to issue new forms. (He called back later in the day and explained that they couldn't reissue the DMR forms and for us to mark through the incorrect toxicity limit and write in the correct limit.)

Appendix F

Excerpt from 2012 Guidelines for Water Reuse

Table 4-5 Summary of State and U.S. Territory water reuse regulations and guidelines*

● The intent of the state's regulations or guidelines is oversight of water reuse

□ The intent of the state's regulations or guidelines is oversight of disposal and water reuse is considered incidental

-- The state does not have water reuse regulations or guidelines but may permit reuse on a case-by-case basis.

State	Regulations	Guidelines	No Regulations or Guidelines (1)	Change from 2004 Edition	Urban Reuse – Unrestricted	Urban Reuse – Restricted	Agricultural Reuse – Food Crops	Agricultural Reuse – Processed Food Crops and Non-Food Crops	Impoundments – Unrestricted	Impoundments – Restricted	Environmental Reuse	Industrial Reuse	Groundwater Recharge – Nonpotable Reuse	Indirect Potable Reuse
Alabama		□				□		□						
Alaska	□							□						
Arizona	●			Update	●	●	●	●		●	●	●	●	●
Arkansas	□			New (2)			□							
California	●			Update	●	●	●	●	●	●		●	●	●
Colorado	●				●	●						●		
Commonwealth of the Northern Mariana Islands (CNMI)	□			(3)		□		□						
Connecticut			--											
Delaware	●			Update	●	●	●	●	●	●		●	□	
District of Columbia			--											
Florida	●			Update	●	●	●	●			●	●	●	●
Georgia		●		Update	●	●		●						
Guam				(4)										
Hawaii		●			●	●	●	●		●		●	●	●
Idaho	●			Update	●	●	●	●				●	●	
Illinois	●				●	●		●						
Indiana	□			Update	□	□	□	□						
Iowa	●					●		●						
Kansas		□			□	□	□	□				□		
Kentucky			--											
Louisiana			--								●			

Table 4-4 Suggested guidelines for water reuse

Reuse Category and Description	Treatment	Reclaimed Water Quality [2]	Reclaimed Water Monitoring	Setback Distances [3]	Comments
Urban Reuse					
Unrestricted The use of reclaimed water in nonpotable applications in municipal settings where public access is not restricted.	▪ Secondary[(4)] ▪ Filtration[(5)] ▪ Disinfection[(6)]	▪ pH = 6.0-9.0 ▪ ≤ 10 mg/l BOD [(7)] ▪ ≤ 2 NTU [(8)] ▪ No detectable fecal coliform /100 ml [(9,10)] ▪ 1 mg/l Cl2 residual (min.) [(11)]	▪ pH – weekly ▪ BOD - weekly ▪ Turbidity - continuous ▪ Fecal coliform - daily ▪ Cl2 residual – continuous	▪ 50 ft (15 m) to potable water supply wells; increased to 100 ft (30 m) when located in porous media [(18)]	▪ At controlled-access irrigation sites where design and operational measures significantly reduce the potential of public contact with reclaimed water, a lower level of treatment, e.g., secondary treatment and disinfection to achieve < 14 fecal coli/100 ml may be appropriate. ▪ Chemical (coagulant and/or polymer) addition prior to filtration may be necessary to meet water quality recommendations. ▪ The reclaimed water should not contain measurable levels of pathogens. [(12)] ▪ Reclaimed water should be clear and odorless. ▪ Higher chlorine residual and/or a longer contact time may be necessary to assure that viruses and parasites are inactivated or destroyed. ▪ Chlorine residual > 0.5 mg/l in the distribution system is recommended to reduce odors, slime, and bacterial regrowth. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.
Restricted The use of reclaimed water in nonpotable applications in municipal settings where public access is controlled or restricted by physical or institutional barriers, such as fencing, advisory signage, or temporal access restriction	▪ Secondary [(4)] ▪ Disinfection [(6)]	▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD [(7)] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform /100 ml [(9, 13, 14)] ▪ 1 mg/l Cl2 residual (min.) [(11)]	▪ pH – weekly ▪ BOD – weekly ▪ TSS – daily ▪ Fecal coliform - daily ▪ Cl2 residual – continuous	▪ 300 ft (90 m) to potable water supply wells ▪ 100 ft (30 m) to areas accessible to the public (if spray irrigation)	▪ If spray irrigation, TSS less than 30 mg/l may be necessary to avoid clogging of sprinkler heads. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements. ▪ For use in construction activities including soil compaction, dust control, washing aggregate, making concrete, worker contact with reclaimed water should be minimized and a higher level of disinfection (e.g. < 14 fecal coli/100 ml) should be provided when frequent worker contact with reclaimed water is likely.
Agricultural Reuse					
Food Crops [15] The use of reclaimed water for surface or spray irrigation of food crops which are intended for human consumption, consumed raw.	▪ Secondary [(4)] ▪ Filtration [(5)] ▪ Disinfection [(6)]	▪ pH = 6.0-9.0 ▪ ≤ 10 mg/l BOD [(7)] ▪ ≤ 2 NTU [(8)] ▪ No detectable fecal coliform/100 ml [(9,10)] ▪ 1 mg/l Cl_2 residual (min.) [(11)]	▪ pH – weekly ▪ BOD - weekly ▪ Turbidity - continuous ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 50 ft (15 m) to potable water supply wells; increased to 100 ft (30 m) when located in porous media [(18)]	▪ See Table 3-5 for other recommended chemical constituent limits for irrigation. ▪ Chemical (coagulant and/or polymer) addition prior to filtration may be necessary to meet water quality recommendations. ▪ The reclaimed water should not contain measurable levels of pathogens. [(12)] ▪ Higher chlorine residual and/or a longer contact time may be necessary to assure that viruses and parasites are inactivated or destroyed. ▪ High nutrient levels may adversely affect some crops during certain growth stages. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.
Processed Food Crops [15] The use of reclaimed water for surface irrigation of food crops which are intended for human consumption, commercially processed. *Non-Food Crops* The use of reclaimed water for irrigation of crops which are not consumed by humans, including fodder, fiber, and seed crops, or to irrigate pasture land, commercial nurseries, and sod farms.	▪ Secondary [(4)] ▪ Disinfection [(6)]	▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD [(7)] ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coli/100 ml [(9,13, 14)] ▪ 1 mg/l Cl2 residual (min.) [(11)]	▪ pH – weekly ▪ BOD - weekly ▪ TSS - daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 300 ft (90 m) to potable water supply wells ▪ 100 ft (30 m) to areas accessible to the public (if spray irrigation)	▪ See Table 3-5 for other recommended chemical constituent limits for irrigation. ▪ If spray irrigation, TSS less than 30 mg/l may be necessary to avoid clogging of sprinkler heads. ▪ High nutrient levels may adversely affect some crops during certain growth stages. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements. ▪ Milking animals should be prohibited from grazing for 15 days after irrigation ceases. A higher level of disinfection, e.g., to achieve < 14 fecal coli/100 ml, should be provided if this waiting period is not adhered to.

Table 4-4 Suggested guidelines for water reuse

Reuse Category and Description	Treatment	Reclaimed Water Quality [2]	Reclaimed Water Monitoring	Setback Distances [3]	Comments
Impoundments					
Unrestricted The use of reclaimed water in an impoundment in which no limitations are imposed on body-contact.	▪ Secondary (4) ▪ Filtration (5) ▪ Disinfection (6)	▪ pH = 6.0-9.0 ▪ ≤ 10 mg/l BOD (7) ▪ ≤ 2 NTU (8) ▪ No detectable fecal coliform/100 ml (9,10) ▪ 1 mg/l Cl2 residual (min.) (11)	▪ pH – weekly ▪ BOD – weekly ▪ Turbidity – continuous ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 500 ft (150 m) to potable water supply wells (min.) if bottom not sealed	▪ Dechlorination may be necessary to protect aquatic species of flora and fauna. ▪ Reclaimed water should be non-irritating to skin and eyes. ▪ Reclaimed water should be clear and odorless. ▪ Nutrient removal may be necessary to avoid algae growth in impoundments. ▪ Chemical (coagulant and/or polymer) addition prior to filtration may be necessary to meet water quality recommendations. ▪ Reclaimed water should not contain measurable levels of pathogens. (12) ▪ Higher chlorine residual and/or a longer contact time may be necessary to assure that viruses and parasites are inactivated or destroyed. ▪ Fish caught in impoundments can be consumed. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.
Restricted The use of reclaimed water in an impoundment where body-contact is restricted.	▪ Secondary (4) ▪ Disinfection (6)	▪ ≤ 30 mg/l BOD (7) ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml (9,13, 14) ▪ 1 mg/l Cl_2 residual (min.) (11)	▪ pH – weekly ▪ TSS – daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 500 ft (150 m) to potable water supply wells (min.) if bottom not sealed	▪ Nutrient removal may be necessary to avoid algae growth in impoundments. ▪ Dechlorination may be necessary to protect aquatic species of flora and fauna. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.
Environmental Reuse					
Environmental Reuse The use of reclaimed water to create wetlands, enhance natural wetlands, or sustain stream flows.	▪ Variable ▪ Secondary (4) and disinfection (6) (min.)	Variable, but not to exceed: ▪ ≤30 mg/l BOD (7) ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml (9,13, 14) ▪ 1 mg/l Cl_2 residual (min.) (11)	▪ BOD – weekly ▪ SS – daily ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous		▪ Dechlorination may be necessary to protect aquatic species of flora and fauna. ▪ Possible effects on groundwater should be evaluated. ▪ Receiving water quality requirements may necessitate additional treatment. ▪ Temperature of the reclaimed water should not adversely affect ecosystem. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.
Industrial Reuse					
Once-through Cooling	▪ Secondary (4)	▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD (7) ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml (9,13, 14) ▪ 1 mg/l Cl_2 residual (min.) (11)	▪ pH – weekly ▪ BOD – weekly ▪ TSS – weekly ▪ Fecal coliform - daily ▪ Cl_2 residual – continuous	▪ 300 ft (90 m) to areas accessible to the public	▪ Windblown spray should not reach areas accessible to workers or the public.
Recirculating Cooling Towers	▪ Secondary (4) ▪ Disinfection (6) (chemical coagulation and filtration (5) may be needed)	Variable, depends on recirculation ratio: ▪ pH = 6.0-9.0 ▪ ≤ 30 mg/l BOD (7) ▪ ≤ 30 mg/l TSS ▪ ≤ 200 fecal coliform/100 ml (9,13, 14) ▪ 1 mg/l Cl_2 residual (min.) (11)		▪ 300 ft (90 m) to areas accessible to the public. May be reduced if high level of disinfection is provided.	▪ Windblown spray should not reach areas accessible to workers or the public. ▪ Additional treatment by user is usually provided to prevent scaling, corrosion, biological growths, fouling and foaming. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.
Other Industrial uses – e.g. boiler feed, equipment washdown, processing, power generation, and in the oil and natural gas production market (including hydraulic fracturing) have requirements that depends on site specific end use (See Chapter 3)					
Groundwater Recharge – Nonpotable Reuse					
The use of reclaimed water to recharge aquifers which are not used as a potable drinking water source.	▪ Site specific and use dependent ▪ Primary (min.) for spreading ▪ Secondary (4) (min.) for injection	▪ Site specific and use dependent	▪ Depends on treatment and use	▪ Site specific	▪ Facility should be designed to ensure that no reclaimed water reaches potable water supply aquifers. ▪ See Chapter 3 of this document and Section 2.5 of the 2004 guidelines for more information. ▪ For injection projects, filtration and disinfection may be needed to prevent clogging. ▪ For spreading projects, secondary treatment may be needed to prevent clogging. ▪ See Section 3.4.3 in the 2004 guidelines for recommended treatment reliability requirements.

Table 4-4 Suggested guidelines for water reuse

Reuse Category and Description	Treatment	Reclaimed Water Quality [2]	Reclaimed Water Monitoring	Setback Distances [3]	Comments
Indirect Potable Reuse					
Groundwater Recharge by Spreading into Potable Aquifers	▪ Secondary (4) ▪ Filtration (5) ▪ Disinfection (6) ▪ Soil aquifer treatment	Includes, but not limited to, the following: ▪ No detectable total coliform/100 ml (9, 10) • 1 mg/l Cl_2 residual (min.) (11) ▪ pH = 6.5 – 8.5 ▪ ≤ 2 NTU (8) ▪ ≤ 2 mg/l TOC of wastewater origin ▪ Meet drinking water standards after percolation through vadose zone	Includes, but not limited to, the following: ▪ pH – daily ▪ Total coliform – daily ▪ Cl_2 residual – continuous ▪ Drinking water standards – quarterly ▪ Other (17) – depends on constituent ▪ TOC – weekly ▪ Turbidity – continuous ▪ Monitoring is not required for viruses and parasites: their removal rates are prescribed by treatment requirements	▪ Distance to nearest potable water extraction well that provides a minimum of 2 months retention time in the underground.	▪ Depth to groundwater (i.e., thickness to the vadose zone) should be at least 6 feet (2m) at the maximum groundwater mounding point. ▪ The reclaimed water should be retained underground for at least 2 months prior to withdrawal. ▪ Recommended treatment is site-specific and depends on factors such as type of soil, percolation rate, thickness of vadose zone, native groundwater quality, and dilution. ▪ Monitoring wells are necessary to detect the influence of the recharge operation on the groundwater. ▪ Reclaimed water should not contain measurable levels of pathogens after percolation through the vadose zone.(12) ▪ See Section 3.4.3 in the 2004 Guidelines for recommended treatment reliability requirements. ▪ Recommended log-reductions of viruses, *Giardia*, and *Cryptosporidium* can be based on challenge tests or the sum of log-removal credits allowed for individual treatment processes. Monitoring for these pathogens is not required. ▪ Dilution of reclaimed water with waters of non-wastewater origin can be used to help meet the suggested TOC limit.
Groundwater Recharge by Injection into Potable Aquifers	▪ Secondary (4) ▪ Filtration (5) ▪ Disinfection (6) ▪ Advanced wastewater treatment (16)	Includes, but not limited to, the following: ▪ No detectable total coliform/100 ml (9, 10) ▪ 1 mg/l Cl_2 residual (min.) (11) ▪ pH = 6.5 – 8.5 ▪ ≤ 2 NTU (8) ▪ ≤ 2 mg/l TOC of wastewater origin ▪ Meet drinking water standards	Includes, but not limited to, the following: ▪ pH – daily ▪ Turbidity – continuous ▪ Total coliform – daily ▪ Cl_2 residual – continuous ▪ TOC – weekly ▪ Drinking water standards – quarterly ▪ Other (17) – depends on constituent ▪ Monitoring is not required for viruses and parasites: their removal rates are prescribed by treatment requirements	▪ Distance to nearest potable water extraction well that provides a minimum of 2 months retention time in the underground.	▪ The reclaimed water should be retained underground for at least 2 months prior to withdrawal. ▪ Monitoring wells are necessary to detect the influence of the recharge operation on the groundwater. ▪ Recommended quality limits should be met at the point of injection. ▪ The reclaimed water should not contain measurable levels of pathogens at the point of injection. ▪ Higher chlorine residual and/or a longer contact time may be necessary to assure virus inactivation. ▪ See Section 3.4.3 in the 2004 Guidelines for recommended treatment reliability requirements. ▪ Recommended log-reductions of viruses, *Giardia*, and *Cryptosporidium* can be based on challenge tests or the sum of log-removal credits allowed for individual treatment processes. Monitoring for these pathogens is not required. ▪ Dilution of reclaimed water with waters of non-wastewater origin can be used to help meet the suggested TOC limit.
Augmentation of Surface Water Supply Reservoirs	▪ Secondary (4) ▪ Filtration (5) ▪ Disinfection (6) ▪ Advanced wastewater treatment (16)	Includes, but not limited to, the following: ▪ No detectable total coliform/100 ml (9, 10) ▪ 1 mg/l Cl_2 residual (min.) (11) ▪ pH = 6.5 – 8.5 ▪ ≤ 2 NTU (8) ▪ ≤ 2 mg/l TOC of wastewater origin ▪ Meet drinking water standards		▪ Site specific – based on providing 2 months retention time between introduction of reclaimed water into a raw water supply reservoir and the intake to a potable water treatment plant.	▪ The reclaimed water should not contain measurable levels of pathogens. (12) ▪ Recommended level of treatment is site-specific and depends on factor such as receiving water quality, time and distance to point of withdrawal, dilution and subsequent treatment prior to distribution for potable uses. ▪ Higher chlorine residual and/or a longer contact time may be necessary to assure virus and protozoa inactivation. ▪ See Section 3.4.3 in the 2004 Guidelines for recommended treatment reliability requirements. ▪ Recommended log-reductions of viruses, *Giardia*, and *Cryptosporidium* can be based on challenge tests or the sum of log-removal credits allowed for individual treatment processes. Monitoring for these pathogens is not required. ▪ Dilution of reclaimed water with water of non-wastewater origin can be used to help meet the suggested TOC limit.

Footnotes

(1) These guidelines are based on water reclamation and reuse practices in the U.S., and are specifically directed at states that have not developed their own regulations or guidelines. While the guidelines should be useful in may areas outside the U.S., local conditions may limit the applicability of the guidelines in some countries (see Chapter 9). It is explicitly stated that the direct application of these suggested guidelines will not be used by USAID as strict criteria for funding.
(2) Unless otherwise noted, recommended quality limits apply to the reclaimed water at the point of discharge from the treatment facility.
(3) Setback distances are recommended to protect potable water supply sources from contamination and to protect humans from unreasonable health risks due to exposure to reclaimed water.
(4) Secondary treatment process include activated sludge processes, trickling filters, rotating biological contractors, and may stabilization pond systems. Secondary treatment should produce effluent in which both the BOD and SS do not exceed 30 mg/l.
(5) Filtration means: the passing of wastewater through natural undisturbed soils or filter media such as sand and/or anthracite; or the passing of wastewater through microfilters or other membrane processes.
(6) Disinfection means the destruction, inactivation, or removal of pathogenic microorganisms by chemical, physical, or biological means. Disinfection may be accomplished by chlorination, ozonation, other chemical disinfectants, UV, membrane processes, or other processes.
(7) As determined from the 5-day BOD test.
(8) The recommended turbidity should be met prior to disinfection. The average turbidity should be based on a 24-hour time period. The turbidity should not exceed 5 NTU at any time. If SS is used in lieu of turbidity, the average SS should not exceed 5 mg/l. If membranes are used as the filtration process, the turbidity should not exceed 0.2 NTU and the average SS should not exceed 0.5 mg/l.
(9) Unless otherwise noted, recommended coliform limits are median values determined from the bacteriological results of the last 7 days for which analyses have been completed. Either the membrane filter or fermentation tube technique may be used.
(10) The number of total or fecal coliform organisms (whichever one is recommended for monitoring in the table) should not exceed 14/100 ml in any sample.
(11) This recommendation applies only when chlorine is used as the primary disinfectant. The total chlorine residual should be met after a minimum actual modal contact time of at least 90 minutes unless a lesser contact time has been demonstrated to provide indicator organism and pathogen reduction equivalent to those suggested in these guidelines. In no case should the actual contact time be less than 30 minutes.
(12) It is advisable to fully characterize the microbiological quality of the reclaimed water prior to implementation of a reuse program.
(13) The number of fecal coliform organisms should not exceed 800/100 ml in any sample.
(14) Some stabilization pond systems may be able to meet this coliform limit without disinfection.
(15) Commercially processed food crops are those that, prior to sale to the public or others, have undergone chemical or physical processing sufficient to destroy pathogens.
(16) Advanced wastewater treatment processes include chemical clarification, carbon adsorption, reverse osmosis and other membrane processes, advanced oxidation, air stripping, ultrafiltration, and ion exchange.
(17) Monitoring should include inorganic and organic compounds, or classes of compounds, that are known or suspected to be toxic, carcinogenic, teratogenic, or mutagenic and are not included in the drinking water standards.
(18) See Section 4.4.3.7 for additional precautions that can be taken when a setback distance of 100 ft (30 m) to potable water supply wells in porous media is not feasible.

Appendix G

Cross Cutter Letter Responses

RECEIVED JUN 16 2014

REC'D	
JRW	
RSQ	
DLD	
AWR	
JGD	
MLB	
KST	
SCL	

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES

Steven L. Beshear
Governor

#1 Sportsman's Lane
Frankfort, Kentucky 40601
Phone (502) 564-3400
1-800-858-1549
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fw.ky.gov

Bob Stewart
Secretary

Gregory K. Johnson
Commissioner

June 11, 2014

J. Gregory Davenport, P.E.
Senior Vice President
J.R. Wauford & Company
P.O. Box 140350
Nashville, TN 37214

RE: Environmental Review for the Hammond Wood Wastewater Treatment Plant Expansion, Christian County, Kentucky

Dear Mr. Davenport:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for the above-referenced information. The Kentucky Fish and Wildlife Information System (KFWIS) indicates the federally listed Gray Myotis (*Myotis grisescens*), state listed Smallscale Darter (*Etheostoma microlepidum*), and state listed Mountain Creekshell (*Villosa vanuxemensis vanuxemensis*) are known to occur within close proximity of the proposed project area. However, KDFWR does not expect impacts to listed species or their critical habitat due to the location and nature of the project. Please be aware that our database system is a dynamic one that only represents our current knowledge of the various species distributions.

To minimize indirect impacts to aquatic resources strict erosion control measures should be developed and implemented prior to construction to minimize siltation into streams and storm water drainage systems located within the project area. Such erosion control measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins, pump around, and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

Construction activities involving the sewer crossing of the North Fork Little River should be completed during the late summer to fall to reduce impacts during the fish spawning season and to prevent sedimentation problems from excessive rain events. If you have any questions or require additional information, please call me at (502) 564-7109 Extension 4473.

Sincerely,

Joseph Zimmerman, Environmental Biologist

Cc: Environmental Section File

RECEIVED JUN 19 2014

United States Department of Agriculture

NRCS Natural Resources Conservation Service

1925 Old Main Street
Suite 2
Maysville, KY. 41056
Ph: 606-759-5570

To: J. Gregory Davenport, P.E.
J.R. Wauford & Company
2835 Lebanon Road, P.O. Box 140350
Nashville, TN 37214

June 16, 2014

Re: 201 Facility Plan Admendment – Cross cutter Letter
Hammond Wood Wastewater Treatment Plant Expansion
Hopkinsville Water Environmental Authority
Hopkinsville, Kentucky
JRWCO Job No. 1983

Mr. Davenport,

According to the information in your letter and as can be determined using the maps provided, it appears that all areas of construction will take place either on existing plant property or on previously disturbed areas already considered as prior converted farmlands. These areas are not affecting additional farmlands and do not affect prime farmland or statewide important farmlands. This office does not have additional concerns at this time.

If needed, additional information on the soils of Christian County, KY is available on-line through USDA's Web Soil Survey.

If this office may be of additional assistance, please do not hesitate to contact my office in Maysville Ky. or contact the NRCS District Conservationist at 270-885-8688.

Steve Jacobs
Resource Soil Scientist, NRCS, Maysville, KY.

cc: Joshua Richardson, NRCS District Conservationist, Hopkinsville, KY

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
Regulatory Branch
3701 BELL ROAD
NASHVILLE, TENNESSEE 37214

June 20, 2014

SUBJECT: Reference No. LRN-2014-00624; Hopkinsville Water Environment Authority, 201 Facility Plan Amendment, Proposed Hammond Wood Wastewater Treatment Plant Expansion (6MGD to 9MGD) and North Fork Little River Sewer Crossing, Christian County, KY (JRWCO Job No. 1983)

Mr. J. Gregory Davenport
J. R. Wauford & Company
PO Box 140350
Nashville, TN 37214

Dear Mr. Davenport:

This is in regard to your request for our review of plans for the subject project, described in your letter dated June 2, 2014. The U.S. Army Corps of Engineers (USACE) has regulatory responsibilities pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344). Under Section 10, the USACE regulates any work in, or affecting, navigable waters of the U.S. Under Section 404, the USACE regulates the discharge of dredged and/or fill material into waters of the U.S., including wetlands.

A review of the information provided indicates the project would likely involve work in waters of the U.S. (construction of new gravity sewer line), where a DA permit (Nationwide 12) might be required. The remaining work described, at the treatment plant, would not likely require a DA permit.

We understand that the project proposal may not have specific design plans at this time, and this inquiry is an initial review to obtain grant funds. We have no objections to the applicant receiving grant funds provided the applicant applies for and obtains any required permits prior to any disturbance to streams and/or wetlands that may occur due to project construction. The applicant may apply at any time.

If you have questions regarding this matter, please contact me at the above address or telephone (615) 369-7504.

Sincerely,

Lisa R. Morris

Lisa Morris
Project Manager
Operations Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

RECEIVED JUN 23 2014

June 20, 2014

Mr. J. Gregory Davenport
J. R. Wauford & Company,
Consulting Engineers, Inc.
P. O. Box 140350
Nashville , TN 37214

Re: FWS 2014-B-0570; JRWCO Job No. 1983; Hopkinsville Water Environmental Authority; Hammond Wood WWTP expansion; located in Christian County, Kentucky

Dear Mr. Davenport:

Thank you for the opportunity to provide comments on the above-referenced project. The U.S. Fish and Wildlife Service (Service) has reviewed this proposed project and offers the following comments in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*). This is not a concurrence letter. Please read carefully, as further consultation with the Service may be required.

In accordance with the provisions of the Fish and Wildlife Coordination Act, the Service has reviewed the project with regards to the effects the proposed actions may have on wetlands and/or other jurisdictional waters. We recommend that project plans be developed to avoid impacting wetland areas and/or streams, and reserve the right to review any required federal or state permits at the time of public notice issuance. The U.S. Army Corps of Engineers should be contacted to assist you in determining if wetlands or other jurisdictional waters are present or if a permit is required.

In accordance to section 7 of the ESA, the Service must also consider the effects of actions interrelated and interdependent to the proposed project. "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification and "interdependent actions" are those that have no independent utility apart from the action under consideration. Please inform us of any future actions and/or projects (*i.e.*; developments, sewer lines, etc.) that would reasonably occur as a result of the proposed project so that we may adequately analyze those effects.

In order to assist you in determining if the proposed project has the potential to impact protected species we have searched our records for occurrences of listed species within the vicinity of the proposed project. Based upon the information provided to us and according to our databases, we believe that the following federally listed species have the potential to occur within the project vicinity:

Group	Species	Common name	Legal* Status
Mammals	*Myotis grisescens*	gray bat	E
	Myotis sodalis	Indiana bat	E
	Myotis septentrionalis	Northern long-eared bat	P
Mussels	*Lexingtonia dolabelloides*	slabside pearlymussel	E
	Ptychobranchus subtentum	fluted kidneyshell	E
	Quadrula c. cylindrica	rabbitsfoot	T

* *Key to notations: E = Endangered, T = Threatened, P = Proposed, C = Candidate, CH = Critical Habitat*

We must advise you that collection records available to the Service may not be all-inclusive. Our database is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitats and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality.

Gray bat

Gray bats roost, breed, rear young, and hibernate in caves year round. They migrate between summer and winter caves and will use transient or stopover caves along the way. Gray bats eat a variety of flying aquatic and terrestrial insects present along streams, rivers, and lakes. Low-flow streams produce an abundance of insects and are especially valuable to the gray bat as foraging habitat. For hibernation, the roost site must have an average temperature of 42 to 52 degrees F. Most of the caves used by gray bats for hibernation have deep vertical passages with large rooms that function as cold air traps. Summer caves must be warm, between 57 and 77 degrees F, or have small rooms or domes that can trap the body heat of roosting bats. Summer caves are normally located close to rivers or lakes where the bats feed. Gray bats have been known to fly as far as 12 miles from their colony to feed.

Because we have concerns relating to the gray bat on this project and due to the lack of occurrence information available on this species relative to the proposed project area, we have the following recommendations relative to gray bats.

- Based on the presence of numerous caves, rock shelters, and underground mines in Kentucky, we believe that it is reasonable to assume that other caves, rock shelters, and/or abandoned underground mines may occur within the project area, and, if they occur, they could provide winter/summer habitat for gray bats. Therefore, we would recommend that the project proponent survey the project area for caves, rock shelters, and underground mines, identify any such habitats that may exist on-site, and avoid impacts to those sites pending an analysis of their suitability as gray bat habitat by this office.

- Sediment Best Management Practices (BMPs) should be utilized and maintained to minimize siltation of the streams located within and in the vicinity of the project area, as these streams represent potential foraging habitat for the gray bat.

Indiana bat

The proposed project is located in Indiana bat "potential habitat," therefore we believe that: (1) caves, rockshelters, and abandoned underground mines in the vicinity of and in the project area may potentially provide suitable wintering habitat for the Indiana bat; and (2) forested areas in the vicinity of and in the project area may potentially provide suitable summer roosting and foraging habitat for the Indiana bat. In order to address the concerns and be in compliance with the ESA, we have the following recommendations relative to potential direct and/or indirect effects as a result of impacts to the habitats listed above:

(1) During hibernation, the Indiana bat prefers limestone caves, sandstone rockshelters, and abandoned underground mines with stable temperatures of 39 to 46 degrees F and humidity above 74 percent but below saturation. Prior to hibernation, Indiana bats utilize the forest habitat up to five miles from the hibernacula to feed and roost until temperatures drop to a point that forces them into hibernation. This "swarming" period is dependent upon weather conditions and lasts from about September 15 to about November 15. This is a critical time for Indiana bats, since they are acquiring additional fat reserves and mating prior to hibernation.

Based on the presence of numerous caves, rock shelters, and underground mines in Kentucky, we believe that it is reasonable to assume that other caves, rock shelters, and/or abandoned underground mines may occur within the project area, and, if they occur, they could provide winter habitat for Indiana bats. Therefore, we recommend that the project proponent survey the project area for caves, rock shelters, and underground mines, identify any such habitats that may exist on-site, and avoid impacts to those sites pending an analysis of their suitability as Indiana bat habitat by this office.

(2) The Indiana bat utilizes a wide array of forested habitats, including riparian forests, bottomlands, and uplands for both summer foraging and roosting habitat. Indiana bats typically roost under exfoliating bark, in cavities of dead and live trees, and in snags (*i.e.*, dead trees or dead portions of live trees). Trees in excess of 16 inches diameter at breast height (DBH) are considered optimal for maternity colony roosts, but trees in excess of 9 inches DBH appear to provide suitable maternity roosting habitat. Male Indiana bats have been observed roosting in trees as small as 5 inches DBH.

To address potential impacts to Indiana bat summer roosting and foraging habitat we recommend that the project proponent survey the project site to determine the presence or likely absence of Indiana bats within the project area in an effort to determine if potential effects are likely. A qualified biologist who holds the appropriate collection permits for the Indiana bat must undertake such surveys in accordance with our most current survey guidance. If any Indiana bats are identified, we would request written notification of such occurrence(s) and further coordination and consultation.

As an alternative to surveying, the following options are also available:

- The project proponent can modify the proposed project to eliminate or reduce impacts to suitable Indiana bat habitat, thus avoiding impacts. A habitat assessment may useful in determining if suitable Indiana bat summer roosting or foraging habitat is present in the action area of the proposed project.

- The project proponent can request formal section 7 consultation through the lead federal action agency associated with the proposed project. To request formal consultation, the project proponent would need to submit a Biological Assessment that describes the action and evaluates the effects of the action on the listed species in the project area. After formal consultation is initiated, the Service has 135 days to prepare a Biological Opinion that analyzes the effects of the action on the listed species and recommends strategies to minimize those effects.

- The project proponent may provide the Service with additional information through the informal consultation process, prepared by a qualified biologist, that includes site-specific habitat information and a thorough effects analysis (direct, indirect, and cumulative) to support a "not likely to adversely affect" determination. The Service will review this and decide if there is enough supporting information to concur with the determination.

- The project proponent may choose to assume presence of the species in the project area and enter into a Conservation Memorandum of Agreement (MOA) with the Service to account for the incidental take of Indiana bats. By entering into a Conservation MOA with the Service, Cooperators gain flexibility with regard to the removal of suitable Indiana bat habitat. In exchange for this flexibility, the Cooperator provides recovery-focused conservation benefits to the Indiana bat through the implementation of minimization and mitigation measures that are described in the Indiana Bat Mitigation Guidance for the Commonwealth of Kentucky. For additional information about this option, please notify our office.

Northern long-eared bat

The northern long-eared bat is currently proposed for federal listing under the ESA. No designated critical habitat has been proposed at this time. The entire state of Kentucky is considered potential habitat for the northern long-eared bat. During the summer, northern long-eared bats typically roost singly or in colonies in a wide-variety of forested habitats, where they seek shelter during daylight hours underneath bark or in cavities/crevices of both live trees and snags, including relatively small trees and snags that are less than 5 inches in diameter at breast height (DBH). Northern long-eared bats have also been documented roosting in man-made structures (i.e., buildings, barns, etc.) during the summer. According to current winter occurrence data, northern long-eared bats predominately winter in hibernacula that include caves, tunnels, and underground mine passages.

Although species proposed for listing are not afforded protection under the ESA, when a species is listed, the prohibitions against jeopardizing its continued existence and unauthorized take are effective immediately, **regardless of an action's stage of completion**. Therefore, to avoid significant project delays, we recommend that you contact our office to identify and resolve potential conflicts regarding the northern long-eared bat in your project area.

Federally listed mussel species

Freshwater mussels are one of the most imperiled groups of animals in North America. Reservoir construction, siltation, channelization, and water pollution are all factors that have contributed to the decline of our native mussel populations. The runoff from urban areas has degraded the quality of water and the substrate of many streams. As filter feeders, mussels are sensitive to contaminants and function as indicators of problems with water quality. The lower Cumberland River basin in southern Christian County has not been widely surveyed for mussels, and we believe that there is the potential for federally listed species, including those listed above and others, to be present in North Fork Little River. The Service recommends avoiding direct impacts to North Fork Little River through techniques like directional boring and minimizing indirect impacts by utilizing Best Management Practices to control erosion that would contribute to siltation and sedimentation of North Fork Little River. If these recommendations are not practicable, the Service recommends conducting a habitat assessment and/or a mussel survey of the action area of the proposed project. Please contact us if you have questions about what should be included in a habitat assessment or survey.

Thank you again for your request. Your concern for the protection of endangered and threatened species is greatly appreciated. If you have any questions regarding the information that we have provided, please contact Jessi Miller at (502) 695-0468 extension 104.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

RECEIVED JUN 30 2014

STEVEN L. BESHEAR
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL

BOB STEWART
SECRETARY

THE STATE HISTORIC PRESERVATION OFFICE
300 WASHINGTON STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-5820
www.heritage.ky.gov

CRAIG A. POTTS
EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

June 19, 2014

Mr. J. Gregory Davenport, PE
J.R. Wauford & Company
2835 Lebanon Road
P.O. Box 120350
Nashville, TN 37214

RE: Proposed Hammond Wood Wastewater Treatment Plant Expansion, City of Hopkinsville, Christian County, Kentucky

Dear Mr. Davenport,

Thank you for your correspondence regarding the above referenced project. It is our understanding that the proposed project will primarily take place in areas where that have been previously disturbed by construction. Additionally, there is no demolition planned for this project. Based on the information provided, it is our assessment that this project should not affect historic properties. However, should the project plans change, or should additional information become available regarding cultural resources or citizens' concerns regarding impacts to cultural resources, please submit that information to our office as additional consultation may be warranted.

Should you have any questions, feel free to contact Yvonne Sherrick of my staff at 502- 564-7005 ext 113.

Sincerely,

Craig Potts, Executive Director
Kentucky Heritage Council and
State Historic Preservation Officer

CP:41789-2

Appendix H

HWEA User Rates Effective July 1, 2014

HWEA Est. 1895

401 East Ninth Street
P.O. Box 628
Hopkinsville, KY 42241-0628
Phone 270-887-4246
Fax 270-887-2798
www.hwea-ky.com

July 1, 2014
HWEA Water / Wastewater Rate Schedule

Hopkinsville Water Rate Schedule

Minimum bill 300 cubic feet or less = $9.69
All over 300 cubic feet = $3.23 per 100 cubic feet

Meter Minimum Rate

5/8"	=	$9.69	per month	300 cubic feet
3/4"	=	$19.71	per month	610 cubic feet
1"	=	$27.78	per month	860 cubic feet
1 ½"	=	$50.07	per month	1,550 cubic feet
2"	=	$83.34	per month	2,580 cubic feet
3"	=	$175.41	per month	5,430 cubic feet
4"	=	$276.19	per month	8,550 cubic feet
6"	=	$923.85	per month	28,600 cubic feet
8"	=	$6,040.57	per month	187,000 cubic feet

Hopkinsville Wastewater Rate Schedule

Minimum bill 300 cubic feet or less = $12.42
All over 300 cubic feet $4.14 per 100 cubic feet

Pembroke Water Rate Schedule

Minimum bill 300 cubic feet or less = $10.56
All over 300 cubic feet = $3.52 per 100 cubic feet

Pembroke Wastewater Rate Schedule

Minimum bill 300 cubic feet or less = $15.63
All over 300 cubic feet = $4.59 per 100 cubic feet

Crofton Water Rate Schedule

Minimum bill 300 cubic feet or less = $16.32
All over 300 cubic feet = $3.35 per 100 cubic feet

Crofton Wastewater Rate Schedule

Minimum bill 150 cubic feet or less = $12.50
All over 150 cubic feet = $3.60 per 100 cubic feet

HWEA Est. 1895

401 East Ninth Street
P.O. Box 628
Hopkinsville, KY 42241-0628
Phone 270-887-4246
Fax 270-887-2798
www.hwea-ky.com

July 1, 2014
HWEA Water / Wastewater Rate Schedule

Oak Grove Wastewater Rate Schedule

Minimum bill 1,000 gallons or less = $18.67
All over 1,000 gallons = $5.45 per 1,000 gallons

HWEA Private Fire Protection Connection

Rates And Charges Non-Metered
Billed Semi-Annually In Advance

2" = $71.18 per year	8" = $930.75 per year
3" = $71.18 per year	10" = $1,669.88 per year
4" = $153.30 per year	12" = $2,710.13 per year
6" = $438.00 per year	

HWEA Service Fees

After Hours Meter Set	$75
After Hours Reconnection Fee	$75
Meter Test Fee	$75
Credit Card Chargebacks	$50
ACH Rejects	$50
Returned Checks	$50
Service Reconnection Fee	$50
Meter Set / New Account Fee	$35
Meter Tap Surcharge	$20
Dual Fire Flow Test	$250

HWEA Hours of Operation

7:30 am - 4:30 pm	Drive-Thru
8:00 am - 4:30 pm	Main Office Lobby