SECTION 5: EXISTING ENVIRONMENT IN THE PLANNING AREA

I. Physical

Wetlands

A review of the U.S. Fish and Wildlife Wetlands Inventory shows that there are a multiple freshwater ponds, freshwater emergent, freshwater forested/shrub, lakes, other and one river that lie within the planning area. The wetlands do not impact the existing wastewater collection system and or any future sewer improvements that would be constructed within the wetlands. See Exhibit 5.1 located at the end of this section for the USFWS Wetlands Inventory Map.

Floodplains

A review of the FEMA Floodplains map for the City of Hawesville reveals there are areas within the planning area that are classified as being in a flood hazard zone. The flood hazard zones are primarily along the Ohio River, effected from Ohio River and streams that flow directly into either of the rivers. See Exhibit 5.2 thru 5.3 at the end of this section for the FEMA Map.

Topography

The topography of Hancock County is typical of the perimeter of the Western Kentucky coal field. It is hilly to rolling except near the Ohio River, where wide alluvial flats are present. Locally, particularly in the northeastern part of the county, massive, resistant sandstones contribute to a more rugged terrain characterized by gorge-like valleys and steep, rocky cliffs.

The topography in the western part of the county is more subdued, presenting less variety and fewer prominent features than the eastern part. The hills are lower and more gently sloping, and the valleys have wider bottoms.

The highest elevation in the county is on a ridge about 1 mile east-southeast of Easton, where 840 foot contours are recorded. The greatest local relief is along the Ohio River bluffs, where differences in elevation between the river and the adjacent ridgetops are approximately 300 feet.

The lowest elevation is the Ohio River. The normal pool elevation of the river below Cannelton Locks and Dam is 358 feet. The normal pool elevation upstream from the dam is 383 feet. Floodplain elevations are generally 390 to 400 feet.

The elevation of Hawesville, at the courthouse, is 419 feet. Other elevations are Easton, 563 feet; Lewisport, 394 feet; Pellville, 536 feet; and Roseville, 518 feet.

Geology

Hancock County is located in the northeast corner of the Western Kentucky coal field, along the Ohio River. The City of Hawesville is situated on a large bend along the Ohio River Valley and is the Hancock County seat. The geology of Hancock County and Hawesville can be characterized by being covered mainly by of rocks of the Pennsylvanian age. The Pottsville Escarpment, an eastward-

facing cuesta developed as a result of resistant Caseyville sandstones and conglomerates, approximately follows the eastern border of the county.

The oldest rocks exposed in the county are late Mississippian in age. The Glen Dean Limestone crops out for a short distance along the Ohio River near the northeastern corner of the county along the Breckenridge County line. Tar Springs sandstone is also exposed in the same area, as well as in low hills along KY 3199 (Old US 60) near the eastern boundary of the Planning Area. Soft clay shales of Mississippian Age occupy a narrow north-south belt adjacent to the Hancock-Breckinridge County Line. Elsewhere in the county the bedded rocks are Pennsylvanian sandstones, siltstones, conglomerates and shales with a few thin coals, clays and limestones. Alluvial sands and gravels obscure Paleozoil rocks along most of the county. The structure of Hancock County is essentially a homocline, with the dip of the strata being to the west. Within Hancock County there does exist a few faults within the county.

Groundwater

Hancock County has three providers of public drinking water, City of Hawesville, City of Lewisport and East Daviess County Water Association, serving approximately 95% of all residents of the county. The City of Hawesville provides public drinking water to approximately 1,100 persons in Hancock County. The city utilizes ground wells located along River Road on the Ohio River. The City of Lewisport utilizes ground wells located near the Ohio River for their raw water source. East Daviess County Water Association purchases their potable water from Owensboro Municipal Utilities.

Groundwater from shallow bedrock aquifers is generally soft to moderately hard, but may contain undesirable amounts of iron. Most water from the alluvium is generally harder and contains more iron than water from the bedrock aquifers. Iron and common salt (saline water) are the main naturally occurring constituents most often encountered in objectionable amounts in groundwater. At a minimum, all water supplies should be treated to eliminate bacterial contamination. It is also advisable to have any residential water source tested at least once a year.[1]

Salt water (saline water) is found below fresh groundwater at variable depths throughout the entire state of Kentucky. Depths to the saline groundwater range from 50 feet or less down to 2,000 feet below land surface in Kentucky. "Salinity" is defined as a measure of the quantity of dissolved mineral matter or total dissolved solids (TDS) in water, reported in parts per million (ppm) or milligrams per liter (mg/L); the two forms of measurement are usually equivalent. The term "salt" or "table salt" as used by most people is pure sodium chloride. Sodium and chloride are generally the major component of saline waters in Kentucky, but are not the only constituents. Water having a TDS concentration of less than 1,000 ppm is classified as fresh and water having a TDS concentration of 1,000 ppm or more is classified as saline. [1]

Being aware of the depth to saline groundwater is valuable when planning a water-supply well. Drilling a well too deep through the freshwater interval may cause a good well to be unsuitable for various uses. Care must be taken to prevent contamination of the freshwater zones by the deeper saline waters. Properly constructed water wells will screen the production zone in the targeted aquifer and isolate all other zones by casing and properly grouting and cementing of the space outside the casings in the boreholes.[1]

In Hancock County the fresh-saline interface ranges from elevations of 200 feet mean sea level near the Ohio River up to 300 feet in the remainder of the county. This corresponds to a depth of 150 feet and greater below the level of the principal valley bottoms throughout the county.[1]

According to the Kentucky Division of Water, Groundwater Branch, Hancock County has areas of moderate to moderate-high sensitivity to groundwater pollution. The hydrogeologic sensitivity of an area is defined as the ease and speed with which a contaminant can move into and within a groundwater system. The sensitivity assessment addressed only the naturally occurring hydrogeologic characteristics of an area.

Within the planning area there are streams listed on the 303(d) list. Table 5-1 at the end of this section lists all streams that are listed on the 303(d) of the water reports in the Draft 2014 303(d) List.

Surface Water

The planning area of the City of Hawesville is located within the Green and Tradewater Rivers Basin Management Unit and is comprised of three separate watersheds: South Yellow Fork Creek, Lead Creek and Indian Crreek-Ohio River. There are many unnmaed tributaries within the planning area that ultimately discharge into the Ohio River. The surface waters within the planning area are not classified as impaired streams and no TMDLS have been developed within the area. The planning area does not have a Source Water Area Protection Plan (SWAPP) but the City of Hawesville does have a Wellhead Protection Area, as shown on Exhibit 3.3.

Soils

Soil scientists have determined that there are about 3 major associations located within Hancock County.

The first soil association is Elk-Otwell-Ginat Association that can be described as nearly level to sloping, deep, well drained to poorly drained, medium-textured soils on stream terraces and floodplains. The larger area that the association was discovered extends from the Daviess-Hancock County Line to near Hawesville. The small area of E-O-G association is located in the northeastern part of Hancock County. It is an area of low ridges separated by flats. The ridges are roughly parallel to each other and to the Ohio River. The Elk and Otwell soils are on ridges, and the Ginat soils are on flats. Elk soils are deep, are well drained and are mostly nearly level to sloping. They are brown and have a moderately fine textured subsoil. Otwell soils have a deep fragipan, are moderately well drained and are mostly nearly level or gently sloping. Ginat soils have a fragipan, are poorly drained and are nearly level. They are gray and have a medium-textured or moderately fine textured subsoil.

The second soil association is Loring-Memphis-Belknap Association that can be described as gently sloping to steep, deep, well drained and moderately well drained, medium-textured soils on uplands and nearly level, deep, womewaht poorly drained, medium-textured soils on floodplains. This association is located in an area of uplands south and east of Lewisport. The Loring and Memphis soils are on uplands and the Belknap soils are on floodplains. Both the Loring and

Memphis soils are on side slopes and the Memphis soils are also on hilltops. The Loring soils have a fragipan and are moderately well drained. The Memphis soils are deep and well drained. The Belknap soils are nearly level and are medium textured throughout. Their subsoil contains grayish mottles, a characteristic of somewhat poorly drained soils.

The third soil association is Wellston-Frondorf-Zanesville association that are gently sloping to steep, well drained and moderately well drained, deep and moderately deep, medium-textured soils on uplands. This association is in the central and southern parts of Hancock County. It is a hilly area of gently sloping to steep soils on uplands. The soils formed in a thin layer of loess and in material weathered from sandston, siltstone and shale. Wellston soils are mostly sloping to moderately steep and are on the sides of hills. They are deep over bedrock; are well drained; and have a brown, medium textured or moderately fine textured subsoil. Frondorf soils are stongly sloping to steep and are also on the sides of hills. They are moderately deep over bedrock; are well drained and have a brown, moderately fine textured subsoil that contains fragments of sandstone. Zanesville soils are gently sloping and sloping and are on the tops of hills. They have fragipan; are well drained or moderately well drained; amd have a brown, medium-textured subsoil.[2]

II. Biological

Within the planning area there are multiple species of animals and plants can be found. Table 5-2 lists the animals that are known to exist or have been known to exist within Hancock County that are federally listed as endangered.

The majority of the proposed sanitary sewer infrastructure in this plan encompasses rehabilitation and replacement of the existing sanitary system. Most of the proposed work will involve trenchless technologies and or construct activity on previously disturbed areas which will have a relatively low environmental impact.

III. Cultural

There are no foreseen archaeological and historical resources that may be affected by this plan. The majority of the work planned is in areas that were previously disturbed with the original installation, site work or a combination of both.

IV. Other Resource Features

The City of Hawesville is located along the Ohio River with various industries located within the confines of the county.

The only drinking water source located in the planning area are the groundwater wells for the City of Hawesville. No known outstanding natural resource waters or shellfish beds exist within the planning area.

[1] *Ground Water Resources of Hancock County by Kentucky Geological Survey.*
[2] *Soil Survey of Daviess and Hancock Counties, Kentucky, USDA, Natural Resource Conservation Service, 1974*

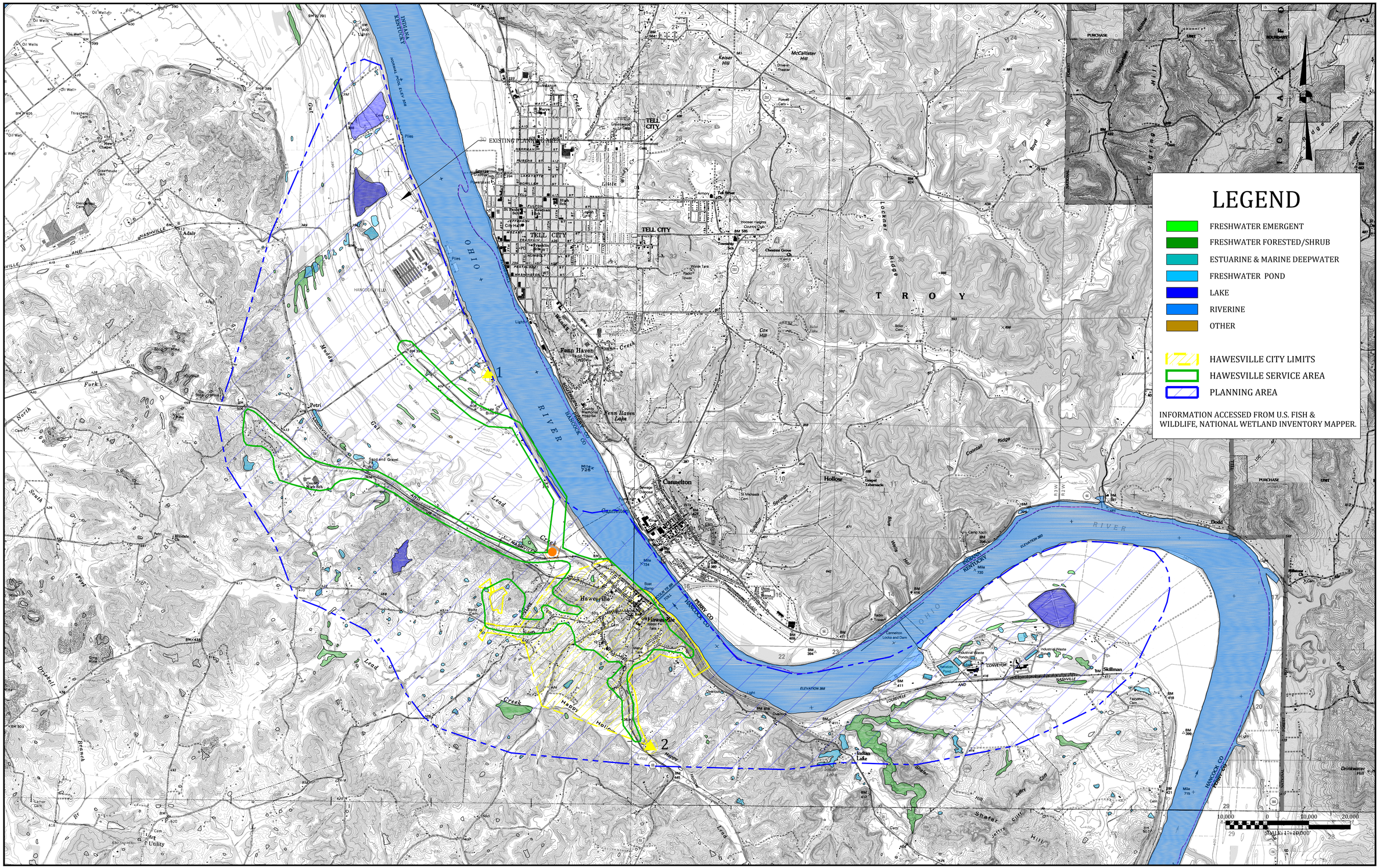
Table 5-1 Streams Listed on 303(d) List

Stream Name	Mile Point	Designated Use(s)	Pollutant(s)	Suspected Sources
Blackford Creek	10.15 to 18.1	Warm water aquatic habitat	Sedimentation/Siltation	Channelization, Loss of Riparian Habitat, Stream bank Modifications/Destabilization
North Branch of South Fork of Panther Creek	0 to 4.2	Warm water aquatic habitat	Cause Unknown	Crop Production (Crop Land or Dry Land), Habitat Modification – other than Hydromodification
Ohio River	720.8 to 676.8	Fish Consumption	Dioxin (including 2, 3, 7, 8-TCDD)	Source Unknown
Ohio River	720.8 to 676.8	Primary Contact Recreation Water	Escherichia coli	Source Unknown
Ohio River	720.8 to 676.8	Fish Consumption	PCB in Water Column	Source Unknown

Table 5-2 Endangered Species

Group	Species	Common Name	Legal Status[1]
Mammals	Myotis sodalist	Iniana bat	E
	Myotis septentrionalis	Northern long-eared bat	P
Mussels	Plethobasus cooperianus	Orangefoot pimpleback	E
	Lampsilis abrupt	Pink mucket	E
	Obovaria retusa	Ring pink	E
	Plethobasus cyphyus	Sheepnose	E
	Pleurobema clava	Clubsheel	E
	Pleurobema plenum	Rough pigtoe	E
	Potamilus capax	Fat Pocketbook	E
	Cyprogenia stegaria	Fanshell	E
Birds	Sterna antillarum athalassos	Interior least tern	E

Notes
[1] E = Endangered, T = Threatened, P = Proposed, C = Candidate, CH = Critical Habitat



P:\PROJECTS\Hawesville\15017 - WWTP\Notes\RFP\DWG\SECTION 5\EXHIBIT 5-1 WETLANDS MAP.dwg KEG 6/12/15

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DRAWN BY:	MRC
CHECKED BY:	MRC
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CITY OF
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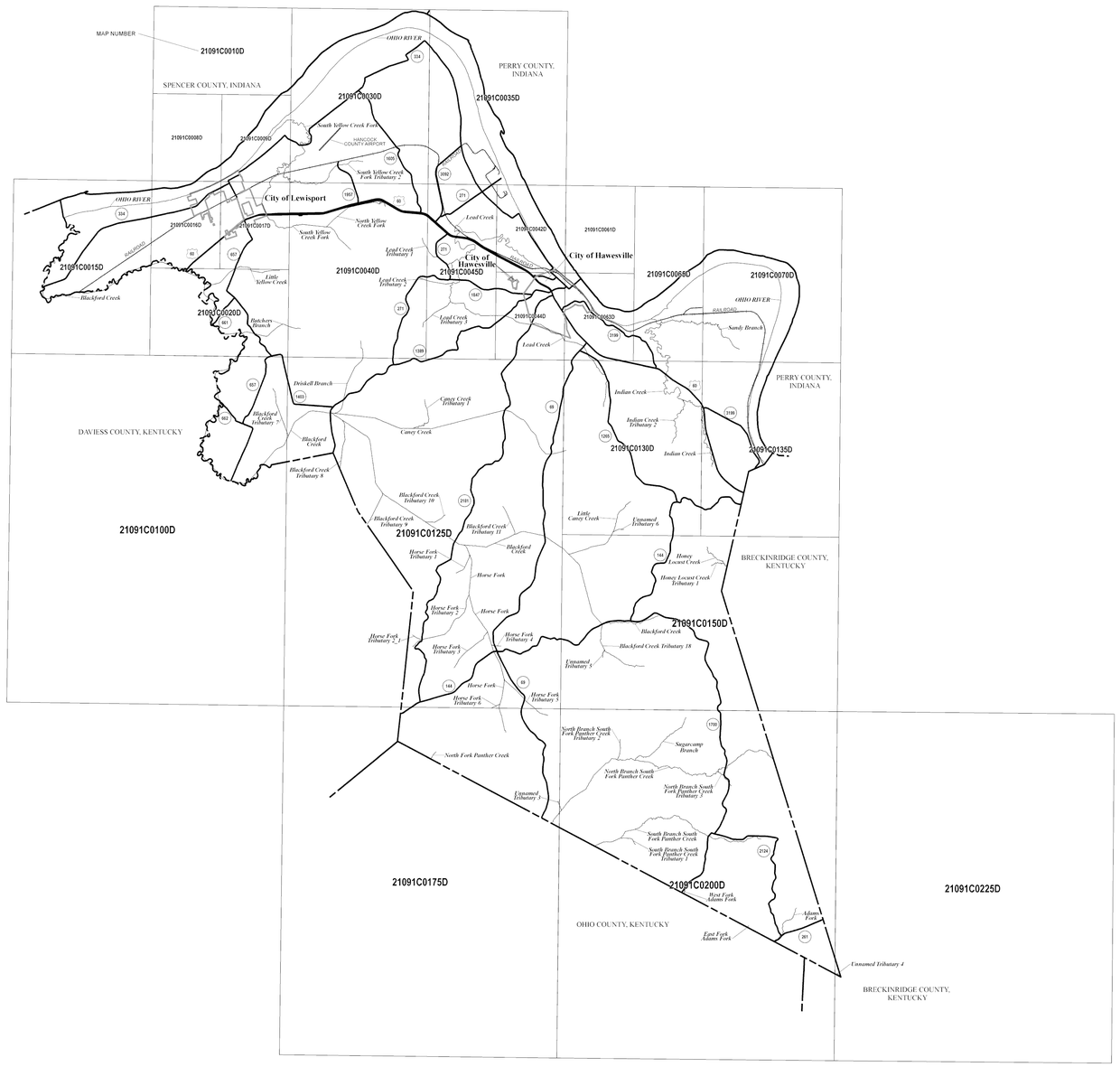
Hancock County, Kentucky

REGIONAL FACILITY PLAN
SECTION 5

WETLANDS MAP

PROJECT NO. 15017

SHEET NO. 5.1



NOTE TO USER

Future revisions to this FIRM Index will only be issued to communities that are located on FIRM panels being revised. This FIRM Index therefore remains valid for FIRM panels dated September 27, 2013 or earlier. Please refer to the "MOST RECENT FIRM PANEL DATE" column in the Listing of Communities table to determine the most recent FIRM Index date for each community.

FIRM Panel Dates For Printed Panels of Hancock County, KY (And Incorporated Areas)

Panel	Effective Date	Panel	Effective Date	Panel	Effective Date
0008 D	SEPTEMBER 27, 2013	0040 D	SEPTEMBER 27, 2013	0125 D	SEPTEMBER 27, 2013
0009 D	SEPTEMBER 27, 2013	0042 D	SEPTEMBER 27, 2013	0130 D	SEPTEMBER 27, 2013
0010 D	SEPTEMBER 27, 2013	0044 D	SEPTEMBER 27, 2013	0135 D	SEPTEMBER 27, 2013
0015 D	SEPTEMBER 27, 2013	0045 D	SEPTEMBER 27, 2013	0150 D	SEPTEMBER 27, 2013
0016 D	SEPTEMBER 27, 2013	0061 D	SEPTEMBER 27, 2013	0175 D	SEPTEMBER 27, 2013
0017 D	SEPTEMBER 27, 2013	0063 D	SEPTEMBER 27, 2013	0200 D	SEPTEMBER 27, 2013
0020 D	SEPTEMBER 27, 2013	0065 D	SEPTEMBER 27, 2013	0225 D	SEPTEMBER 27, 2013
0030 D	SEPTEMBER 27, 2013	0070 D	SEPTEMBER 27, 2013		
0035 D	SEPTEMBER 27, 2013	0100 D	SEPTEMBER 27, 2013		

LISTING OF COMMUNITIES

COMMUNITY NAME	COMMUNITY NUMBER	LOCATED ON PANELS	INITIAL NFIP MAP DATE	INITIAL FIRM DATE	MOST RECENT FIRM PANEL DATE
HANCOCK COUNTY (UNINCORPORATED AREAS)	210256	0008, 0009, 0010, 0015, 0016, 0017, 0020, 0030, 0035, 0040, 0042, 0044, 0045, 0061, 0063, 0065, 0070, 0100, 0125, 0130, 0135, 0150, 0175, 0200, 0225	JUNE 17, 2008	JUNE 17, 2008	SEPTEMBER 27, 2013
HAWESVILLE, CITY OF	210239	0042, 0044, 0063	FEBRUARY 15, 1974	NOVEMBER 5, 1986	SEPTEMBER 27, 2013
LEWISPORT, CITY OF	210093	0008, 0009, 0016, 0017	JANUARY 25, 1974[1]	NOVEMBER 19, 1986	SEPTEMBER 27, 2013

[1]Initial Identification February 1, 1974

MAP DATES

This FIRM Index displays the map date for each FIRM panel at the time that this Index was printed. Because this Index may not be distributed to unaffected communites in subsequent revisions, users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center (MSC) website at http://www.msc.fema.gov, or by calling the FEMA Map Information eXchange (FMIX) at 1-877-336-2627.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

MAP REPOSITORIES

(Maps available for reference only, not for distribution.)

HANCOCK COUNTY
(UNINCORPORATED AREAS):
HANCOCK COUNTY ADMINISTRATION BUILDING
225 MAIN CROSS STREET
HAWESVILLE, KENTUCKY 42348

HAWESVILLE, CITY OF:
HAWESVILLE CITY HALL
395 MAIN STREET
HAWESVILLE, KENTUCKY 42348

LEWISPORT, CITY OF:
LEWISPORT CITY HALL
405 SECOND STREET
LEWISPORT, KENTUCKY 42351

BASE MAP SOURCE

Base map information was provided in digital format by the State of Kentucky Division of Geographic Information (KY DGI). Ortho imagery was originally produced by the National Agriculture Imagery Program (NAIP) in 2010 and has a 1-meter ground resolution.

ELEVATION DATUM

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N / NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

MAP INDEX

FIRM
FLOOD INSURANCE RATE MAP
HANCOCK COUNTY, KENTUCKY
AND INCORPORATED AREAS
(SEE LISTING OF COMMUNITIES TABLE)

MAP INDEX
PANELS PRINTED: 8, 9, 10, 15, 16, 17, 20, 30, 35, 40, 42, 44, 45, 61, 63, 65, 70, 100, 125, 130, 135, 150, 175, 200, 225

MAP REVISED SEPTEMBER 27, 2013
MAP NUMBER 21091CIND0B

State of Kentucky
Federal Emergency Management Agency

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CITY OF
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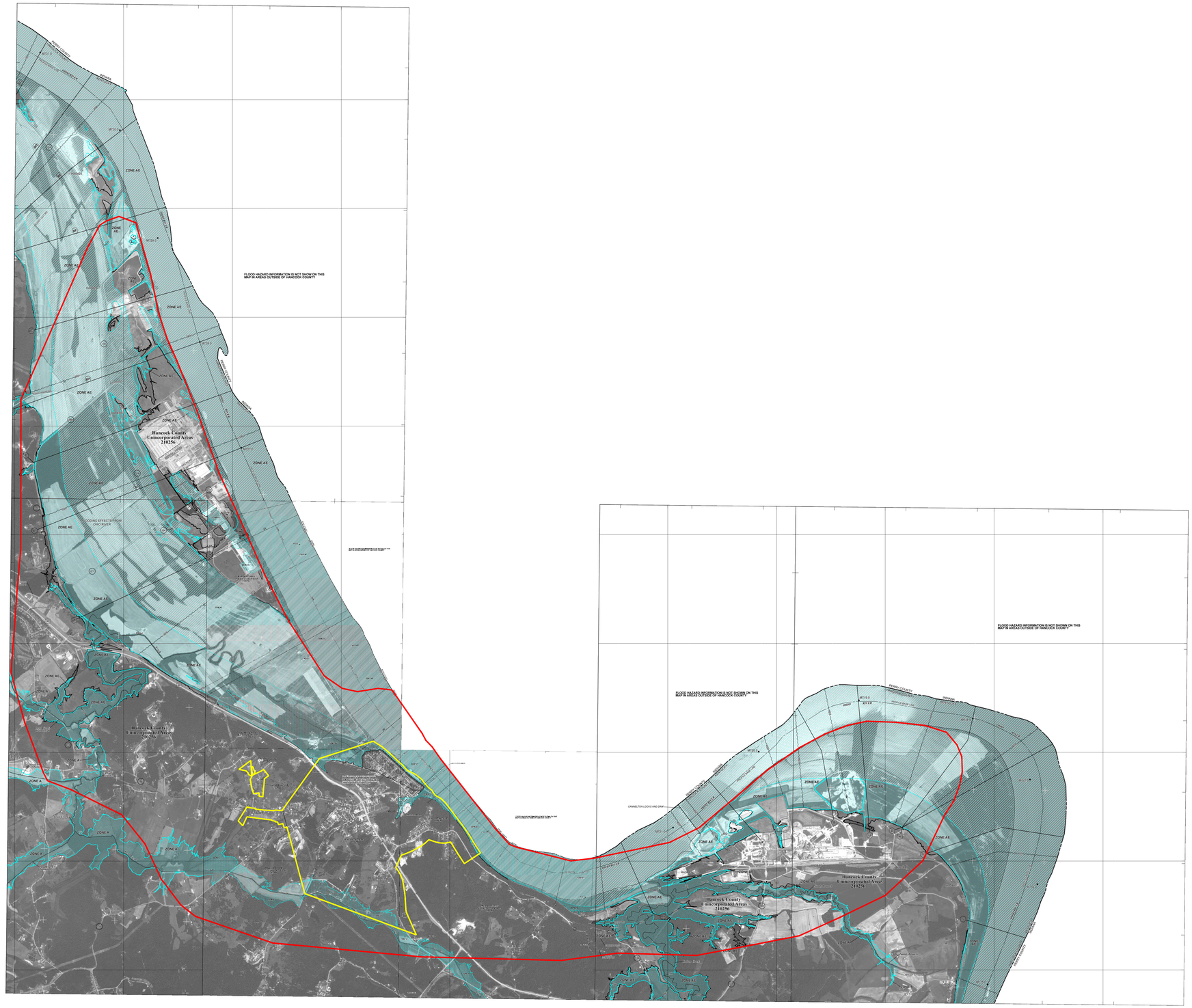
Hancock County, Kentucky

REGIONAL FACILITY PLAN
SECTION 5

FLOODPLAIN MAPPING
HANCOCK COUNTY - MAP INDEX

PROJECT NO. 15017

SHEET NO. 5.2



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CITY OF
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Hancock County, Kentucky

REGIONAL FACILITY PLAN
SECTION 5

FLOODPLAIN MAPPING
HAWESVILLE-HANCOCOK COUNTY

PROJECT NO. 15017

SHEET NO. 5.3

SECTION 6: EXISTING WASTEWATER SYSTEM

I. On-Site Disposal

The City of Hawesville has provided sanitary sewer service since the 1960s. The vast majority of all residents within the existing sewer service are believed to be connected to the sanitary sewer. There are a few sections that are known to not have direct access to the sanitary sewer system. These areas will be targeted to be included in the sanitary sewer system in future projects.

II. Treatment Plant

The Hawesville Wastewater Treatment Plant (KY0020087) is designed for an average daily flow of 0.250 MGD and is a secondary treatment plant utilizing the treatment process of activated sludge. The Hawesville WWTP has the facilities for removing, treating and disposing of settleable and floating solids, for reducing suspended solids and dissolved organic material. The plant effluent is disinfected by UV disinfection to reduce the possible spread of waterborne diseases, and discharged to Lead Creek and ultimately the Ohio River.

Within Hancock County there are two municipal treatment plants: City of Hawesville and City of Lewisport. The current Hawesville WWTP was constructed in the 1960s and has received improvements in the 1990s and in 2014. The existing WWTP has reached the end of its design life and is need of being replaced. The structure and mechanical equipment have been repaired or improved during its service life but the structure is showing various signs of corrosion and cannot be depended on as a long term solution for wastewater treatment. The steel structure near the headworks is severely corroded with very little workable steel available. The air lines need to be replaced but cannot be removed due to either build-up around the lines or they were permanently fixed to the bottom of the tank.

Exhibit 6.1, located at the end of the section, shows the general wastewater flow pattern of the WWTP. Raw wastewater arrives at the WWTP via force mains and immediately enters a manually cleaned bar screen that removes large solids from the raw wastewater. After being screened the wastewater is delivered to the mixing basin. Disposal of solids/debris collected at the headworks are disposed of at a landfill.

After the manually cleaned bar screen wastewater is sampled before entering into the mixing chamber of the WWTP. Table 6-1 displays recorded flows for 2014, the last full year of records.

The WWTP has received Notice of Violations due to exceeding the discharge limits of Nitrogen, Ammonia total (as N) and e Coli.

III. Collection and Conveyance System

The City of Hawesville's existing sanitary sewer collection system is a combination of materials and sizes, which date back to the 1960s era. Since the original construction of the collection system, there have been numerous expansions and upgrades. Exhibit 6.2 at the end of this section shows the existing collection system. Table 6-2 breaks down the approximate lengths, sizes and materials

of pipe used within the collection system and the designated sewer shed. The existing collection system is comprised of approximately 10.5 miles of gravity sewer mains ranging in sizes from 8-inch to 10-inch and approximately 9 miles of force mains ranging in sizes from 3-inch to 8-inch.

The existing collection system can be summarized as a standard collection system design, where gravity sewers collect wastewater and flow to a lift station which then transports the wastewater to the next downstream sewer basin, ultimately ending at the WWTP. Currently none of the force mains are throttled together but discharge into a different gravity sewer basin.

This report has broken down the existing collection system into ten (10) sewer sheds. Three of the sewer sheds were identified as being a source of excessive I/I in the last facility plan amendment. One of the sewer sheds, Alley Line were rehabilitated in the early 2000s leaving the two other sewer sheds: Vastwood and Clay Street sewer shed, to be rehabilitated to remove excessive I/I. Clay Street sewer shed will be drastically altered due to a pending Kentucky Transportation Cabinet roadway project (KY 69 Bridge Approach), with significant amounts of sewer collection lines being relocated which should address a majority of the I/I sources.

Lift Stations

The City of Hawesville currently has ten (10) lift stations. The original lift station network consisted of a drywell airpot pump system. Air was supplied via a central compressor located near the Alley Line Lift Station. This system was replaced and expanded to seven lift stations in the late 1960s. The existing dry wells were converted to wet wells and submersible pumps were installed.

The existing lift stations are in various conditions with some being in good operation condition while others need to have significant improvements ranging from minor cleaning and rework of the concrete wet well to replacement. The Industrial Park Lift Station was added to the system most recently in the early 2000s to provide sewer service to the various industries located along River Road west of Hawesville.

Exhibit 6.3 shows the schematic of the lift station network and collection system. Table 6.3 displays a summary of each lift station and the general operating condition of each station.

IV. Biosolids Disposal

Biosolids collected at the WWTP are disposed at Waste Management at Lewisport, KY.

V. Operation, Maintenance & Compliance

The City of Hawesville has received NOVs related to exceeding the KPDES discharge limits for Nitrogen, Ammonia total and E. coli. These violations are directly related to the inability of the existing treatment facility to reach acceptable treatment limits when the temperatures rise during the summer months and the lower limits are implemented during the same time period.

Beyond the NOVs associated with the WWTP, the system is operated and maintained in accordance with all applicable regulations.

SECTION 6: EXISTING WASTEWATER SYSTEM

Table 6-1 – Summary of Flows

Month - Year	Flow (AVG) MGD	Flow (MAX) MGD
Jan. -2014	0.162	0.282
Feb. – 2014	0.191	0.317
March – 2014	0.145	0.292
April – 2014	0.205	0.391
May – 2014	0.127	0.294
June – 2014	0.117	0.251
July – 2014	0.082	0.135
Aug. – 2014	0.09	0.174
Sept. – 2014	0.08	0.155
Oct. – 2014	0.09	0.253
Nov. – 2014	0.093	0.236
Dec. – 2014	0.118	0.307
Average Flow	**0.125**	**0.391**
Percent of Design Capacity	**50.0%**	**156.4%**

SECTION 6: EXISTING WASTEWATER SYSTEM

Table 6-2 – Summary of Collection System

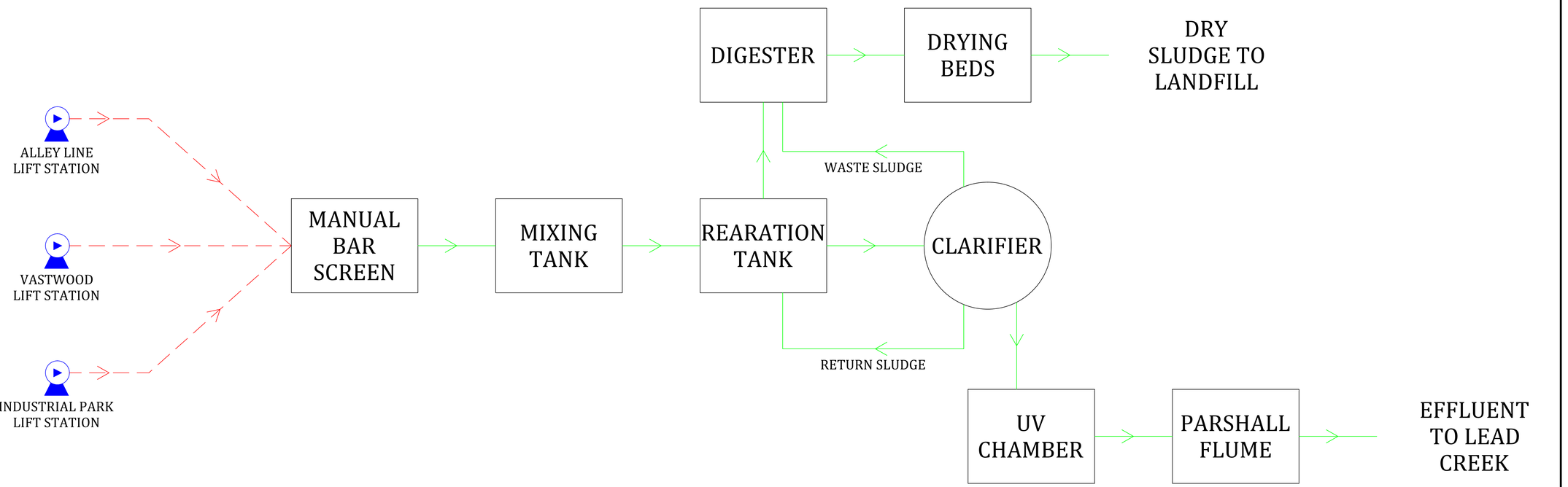
Sewer Shed	Size (inches)	Type (Gravity or Force Main)	Length (Linear Feet)
Alley Line	8	Gravity	15,000
	8	Force Main	3,000
Clay Street	8	Gravity	13,000
	6	Force Main	600
Harrison	8	Gravity	2,000
	4	Force Main	1,600
River Street	8	Gravity	450
	4	Force Main	175
HWY 2181	8	Gravity	1,400
	4	Force Main	1,200
Old Hartford Road	8	Gravity	3,200
	4	Force Main	2,300
HWY 1847	8	Gravity	2,500
	4	Force Main	2,700
Ridgewood	8	Gravity	2,800
	3	Force Main	600
Vastwood	8	Gravity	14,000
	6	Force Main	13,000
Industrial Park	10	Gravity	250
	6	Force Main	14,000
System Totals	10	Gravity	250
	8	Gravity	54,000
	8	Force Main	3,000
	6	Force Main	28,000
	4	Force Main	8,000
	3	Force Main	600

Notes: Pipe footage based upon WRIS mapping, field surveys, record drawings, design plan and GIS mapping.

SECTION 6: EXISTING WASTEWATER SYSTEM

Table 6-3 –Existing Lift Stations

Name	Type	Horsepower (hp)	Pumping Capacity (gpm)	Dynamic Head (feet)
#1 Alley Line	Submersible	7.5	300	45
#2 Clay Street	Submersible	5	180	46
#3 Harrison	Submersible	5	80	33
#4 River Street	Submersible	2	100	25
#5 HWY 2181	Submersible	8	100	48
#6 Old Hartford Road	Submersible	15	100	87
#7 HWY 1847	Submersible	8	122	38
#8 Ridgewood	Submersible	5	40	110
#9 Vastwood	Submersible	15	100	32.5
#10 Industrial Park	Submersible	25	225	100



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NO.	DATE	REVISIONS	BY

DATE:	JUNE 2015
PROJECT MGR:	MRC
DRAWN BY:	MRC
CHECKED BY:	MRC
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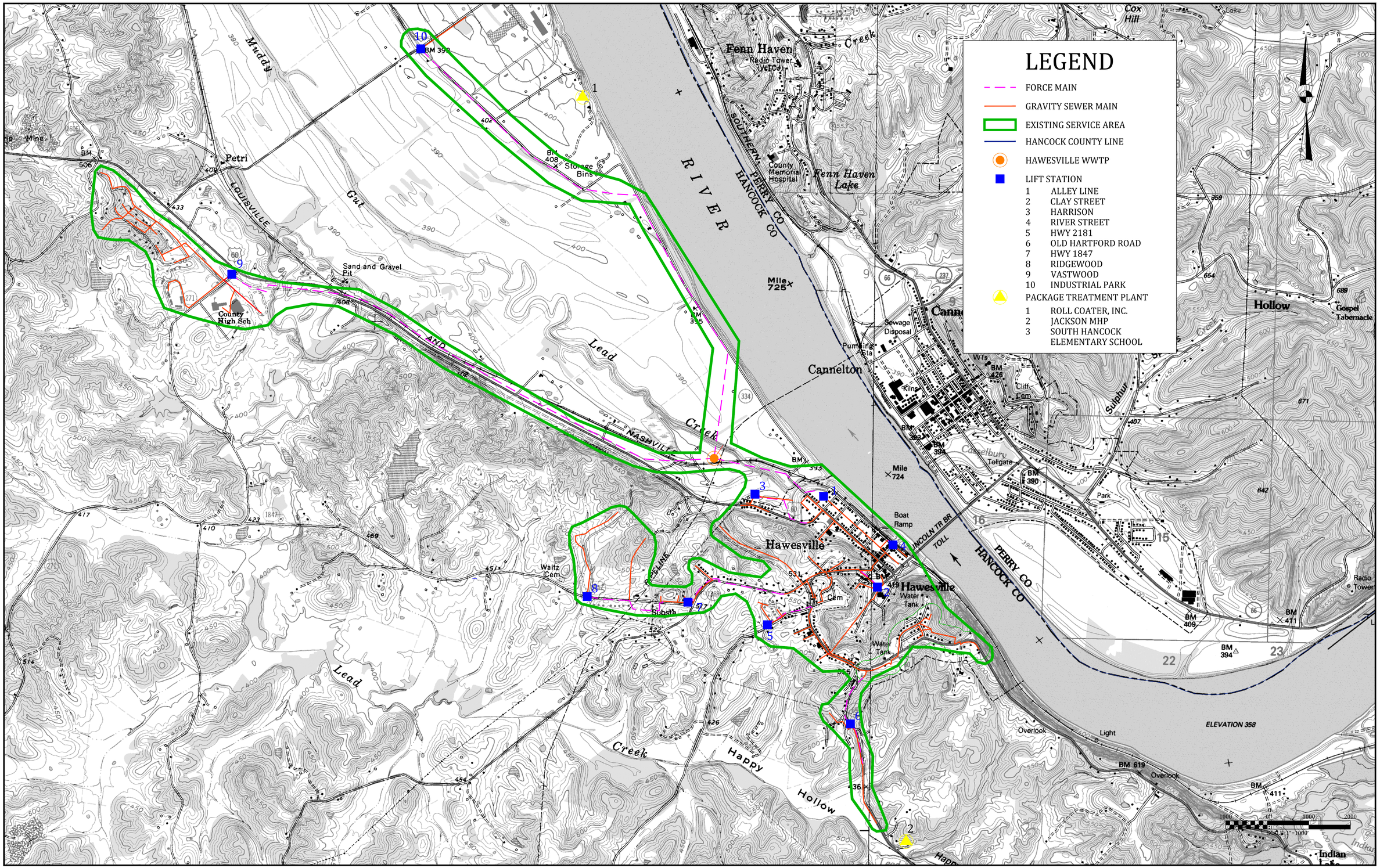
CITY OF
HAWESVILLE
Hancock County, Kentucky

REGIONAL FACILITY PLAN
SECTION 6

EXISTING WWTP FLOW DIAGRAM

PROJECT NO. 15017

SHEET NO. 6.1



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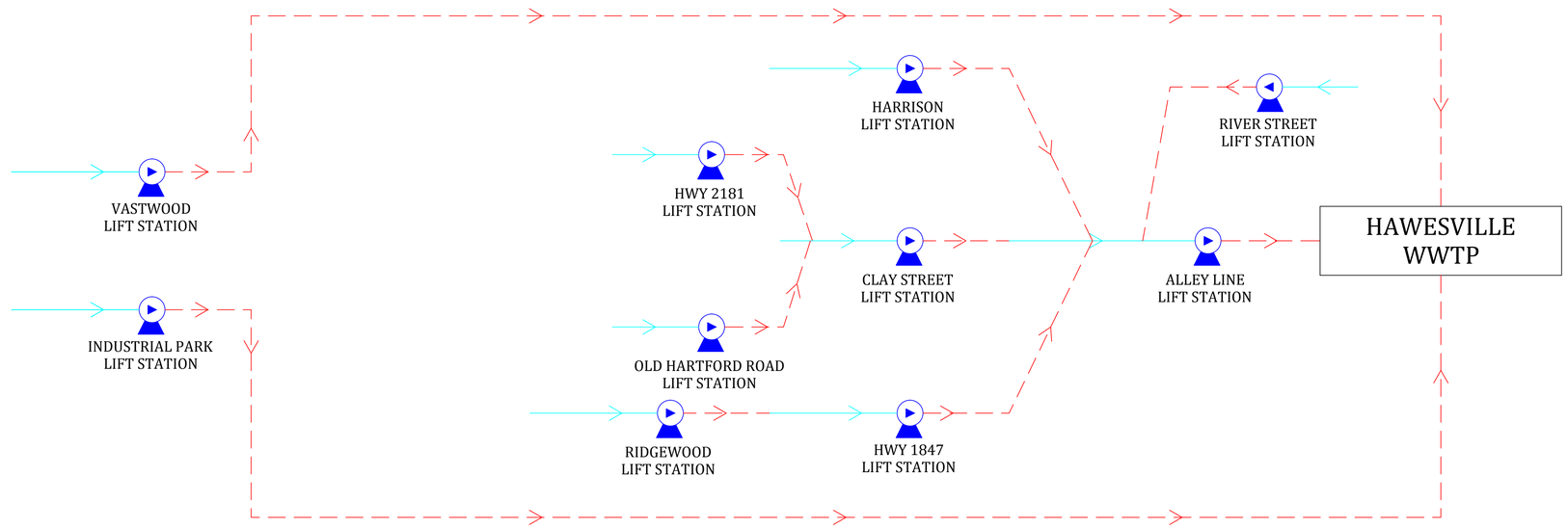
REGIONAL FACILITY PLAN
SECTION 6

EXISTING COLLECTION SYSTEM

PROJECT NO. 15017

SHEET NO. 6.2



LEGEND

- FORCE MAIN SEWER
- GRAVITY SEWER
- LIFT STATION

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KENTUCKY ENGINEERING GROUP, PLLC

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REGIONAL FACILITY PLAN
SECTION 6

EXISTING LIFT STATION NETWORK

PROJECT NO. 15017

SHEET NO. 6.3

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

I. Current Flows

Existing flows are been based upon recorded flow rates at the WWTP and DMR. Table 7-1 displays the wastewater flow rates at the Hawesville WWTP. Table 7-2 breaks down existing flow rates per customer in comparison with the flows set forth by *Design Criteria for Sizing Pump Stations and Wastewater Treatment Plants* from Kentucky Division of Water.

Over the last twelve months the Hawesville WWTP has received an average of 125,000 gallons per day. This is 50% of the permitted design capacity of 250,000 gallons per day. The City of Hawesville currently has 437 sewer customers, 434 of those are residential/commercial customers of Hawesville and the remaining three (3) are industrial customers.

The wastewater influent characteristics are based upon DMRs for 2014 and 2013, the project daily average concentrations of CBOD, TSS and Ammonia received at the WWTP have been 120 mg/l, 210 mg/l and 70 mg/l respectively. It is not expected that these concentrations will change significantly over the planning period due to minimal increase in flows from expansion.

For purposes of billing the City of Hawesville does not delineate between the type of customer, i.e. residential, commercial or industrial. There are three (3) industrial wastewater customers within the existing service area. The vast majority of wastewater received by the Hawesville wastewater collection system is residential with a minor portion being considered commercial/industrial.

Residential & Commercial

Residential wastewater is the majority of the flow transported by the Hawesville collection system to the WWTP. Hawesville's system collects wastewater for 434 residential customers and commercial customers (retail stores, groceries, etc.), which account for approximately 87% (26,097,000 gallons of 29,882,970 gallons) of the total flow received at the WWTP. On average a residential/commercial customer uses approximately 5,000 gallons per month.

Industrial

Industrial wastewater customers only account for 0.7% (3) of the total customers but contribute approximately 13% (3,785,970 gallons) of the total flow received at the WWTP. The City of Hawesville expanded the collection system west to include the industrial corridor along KY 334 & KY 271 via a 6" force main and submersible lift station. On average, an industrial customer discharges approximately 105,166 gallons per month.

II. Future Flows

Future flow for the Hawesville PA must be examined closely so that appropriate attention is given to potential development. There are few items that will greatly alter the projections shown within this section: 1) residential developments around Hawesville & 2) commercial & industrial development. Future flow projections are being based upon the proposed land use in accordance

with *Design Criteria for Sizing Pump Stations and Wastewater Treatment Plants* from Kentucky Division of Water and *Recommended Standards for Wastewater Facilities*.

To forecast the future development, it was determined that the most likely location for future commercial development would take place adjacent to areas where commercial development already exists, but due to limited availability of developable land future commercial development is seen as unlikely. When commercial development is anticipated an examination of the effect of the development upon the wastewater collection system and treatment plant will be necessary.

The future flow generated via industrial activities is seen as most likely to occur with existing industry in the service area connecting to the existing collection system. One such industry is in the final stages of making the connection, Century Aluminum of Hawesville. Century Aluminum has submitted plans and received approval from Kentucky Division of Water regarding installing a lift station and force main to transport wastewater (non-process wastewater) to the existing Industrial Sewer Shed. This project is anticipated to be complete by the beginning of 2016 calendar year.

Table 7-5 lists the associate flows (both residential and commercial) that will be generated by expansion of the collection system as shown in the planning area mapping.

Residential

Residential development will be a function of housing demand and economic conditions. Based upon the recent housing economy and the housing history of Hawesville/Hancock County it is deemed that new developments will not be a big source of new flow. The largest percentage of the projected residential flows will come the way of connecting existing homes to the wastewater collection system via system extensions. Within the City of Hawesville very few areas exist where existing houses do not have access to the wastewater collection system.

Section 4 includes population projections for the planning areas over the next twenty years utilizing projections published by the Kentucky State Data Center. Using these projections in conjunction with the *Design Criteria for Sizing Pump Stations and Wastewater Treatment Plants* from Kentucky Division of Water, future flow rates will be calculated for each planning area. Future flow rates will be based upon 400 gpd per household for single family homes. Table 7-3 shows the projected flows generated for each planning area and the cumulative flow for the WWTP.

Commercial

Future commercial flow is seen as minimum impact upon the capacity of the proposed WWTP. Hawesville is in close proximity to larger commercial areas (Owensboro and Tell City, Indiana) that the likelihood of major future commercial demand is not anticipated. Development is expected to be retail, possibly professional offices and/or service based businesses, which is not a source of large wastewater production. When commercial development is anticipated an examination of the effect of the development upon the wastewater collection system and treatment plant will be necessary.

Industrial

Future industrial flow, more than likely will develop along KY 271 & KY 334 corridor. Many areas adjacent to the existing industrial complexes are prepared for future development or have buildings suitable for new industries to occupy them in the future. Currently there two different industries that have their own treatment facilities and could possibly are connected to the City of Hawesville collection system.

Future commercial flows are being calculated by provisions established by Kentucky Division of Water for the *Design Criteria for Sizing Pump Stations and Wastewater Treatment Plants*. Industrial (manufacturing, industrial parks) shall be sized for 2,000 gallons per acre per 8 hour shift, light industrial (distribution centers and warehouses) shall be sized for 1,000 gallons per acre per 8 hour shift and factories (with showers) shall be sized for 35 gallons per person per 8 hour shift. Acreage for future development is based upon site investigation and area calculations based upon aerial photography. The acreage is then multiplied by wastewater generation (5,000 gal/acre) and a development fee of 0.50 equaling the wastewater generated by the projected commercial development. This number is then divided by the design criteria for single family residences (400 gal/hhd) which calculate an equivalent household(s). Table 7-4 lists the projected industrial flow rates and equivalent household(s) for each planning area.

III. Proposed Design Capacity

A summary of the projected capacity and timing of the projected flow rates required for the collection system expansion is presented in Table 7-5, at the end of this section.

Based upon *Ten States Standard* a peak factor was calculated based upon the total population of Louisa and Lawrence County to account for peak flow.

$FLOW_{PEAK} = FLOW_{AVERAGE}$ X PEAKING FACTOR

PEAKING FACTOR = $(18 + \sqrt{P}) \div (4 + \sqrt{P}) = (18 + \sqrt{1.6}) \div (4 + \sqrt{1.6}) = 3.70$

Where P = population in thousands

Based upon this equation the peaking factor is calculated to be approximately 3.70. The population was established by data from the U.S. Census 2010 for the City of Hawesville and Hancock County.

The recommended wastewater treatment capacity for the planning areas is presented in Table 7-6.

IV. Effluent Design Criteria

KDOW provided a waste load allocation for the proposed WWTP that will be located at the existing WWTP site and discharge into the Ohio River. Table 7-7 presents the design criteria for effluent design criteria.

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-1 – Summary of Flows

Month - Year	Existing Flow Average (gallons)	Existing Flow Maximum (gallons)	Variance between Average & Maximum
December – 2014	118,000	307,000	160%
November – 2014	93,000	236,000	154%
October – 2014	90,000	253,000	181%
September – 2014	80,000	155,000	94%
August – 2014	90,000	174,000	93%
July – 2014	82,000	135,000	65%
June – 2014	117,000	251,000	115%
May – 2014	127,000	294,000	131%
April – 2014	205,000	391,000	91%
March – 2014	145,000	292,000	101%
February – 2014	191,000	317,000	66%
January - 2014	162,000	282,000	74%
Average Flow	**125,000**	**391,000**	**213%**

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-2 – Comparison of Existing Flow Rates

Month - Year	Daily Flow (gallons)	Number of Customers	Average Flow Rate per customer (gpd)
WWTP[1]	125,000	437	286
WWTP[2]	391,000	437	895
KY DOW	-	-	400

Notes:
1 WWTP flows are based upon information received from DMR, averaged for 2014.
2 WWTP flows are based upon information received from DMR, maximum for 2014.

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-3 – Projected Residential Flow Rates

Planning Area		Number of Existing Homes[1]	Number of Potential Homes[2] (Equilivant Homes)	Projected Flows[3]
0-10	Area III	0	0	0
Totals – 0-10		0	0	0
11-20	Area I	6	10	6,400
	Area II	1	5	2,400
	Area III	26	0	10,400
Totals – 11-20		33	15	19,200

Notes:

1. Number of Existing Homes based upon house counts.
2. Number of Potential Homes based upon available acreage believed to be developed for residential homes.
3. Projected Flows based upon 400 gpdphhd per DOW recommendations for design of WWTP and Lift Stations.

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-4 – Projected Industrial Flow Rates

Planning Area	Proposed Acreage for Development[1]	Projected Flows[2] (gallons per day)	Equivalent Households[3]
0-10	20	25,200	63
11-20	5	6,250	16

Notes:

1. Proposed Acreage based upon site investigation and area calculations based upon aerial photographs.
2. Projected Flows calculated based upon available acreage believed to be developed for commercial use. Acreage x 5,000 gallon per day per acre x .25 development percentage.
3. Equivalent Households calculated by dividing Projected Flows by 400 gallons per day per household.

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-5 – Projected Flow from Planning Areas

Planning Area		Number of Existing Homes[1]	Number of Existing Homes Served[2]	Number of Potential Homes[3] (Equilivant Homes)	Projected Flows[4]
0-10	Commercial[5]	-	-	63	25,200
Totals – 0-10		0	0	63	25,200
11-20	Area I	16	16	16	6,400
	Area II	1	1	10	4,000
	Area III	26	26	26	10,400
	Commercial[5]	-	-	16	6,400
Totals – 11-20		43	43	68	24,800
Total		43	43	131	52,400

Notes:

1. Number of Existing Homes based upon house counts.
2. Number of Existing Homes Served are those homes that are anticipated to be served in the planning area.
3. Number of Potential Homes based upon available acreage believed to be developed for residential homes. Acreage / 0.25 homes per acre x .75 (development percentage).
4. Projected Flows based upon 400 gpdphhd per DOW recommendations for design of WWTP and Lift Stations.
5. Commercial equalivalant homes is calculated is Table 7-4.

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-6 – Projected Flow & Population Projections

	2015[1]		2025[1,2,3]		2035[1,2,3]	
	Number of Customers	Flow	Number of Customers	Flow	Number of Customers	Flow
Existing Customers	437	125,000	448	128,145	451	129,005
0-10 Year[4]			1	25,200	1	25,200
11-20 Year[5]					44	24,800
Total Customers	437		449		496	
Total Flow		125,000		153,345		179,005

Notes:

1. Number of Customers based upon customer accounts from City of Hawesville. Flow is based upon flow recordings from meter at WWTP.
2. Number of Customers based upon customer accounts & house counts based upon population projections.
3. Existing and Potential Customer numbers are calculated with the growth/loss rates.
4. 0-10 Year Planning Area number of customers includes existing structures, potential residential and commercial structures.
5. 11-20 Year Planning Area number of customers includes existing structures, potential residential and commercial structures.

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-7 – Projected WWTP Capacity

	2015		2025		2035	
	Average Daily Flow (MGD)	Peak Hour Flow[3] (MGD)	Average Daily Flow (MGD)	Peak Daily Flow[3] (MGD)	Average Daily Flow (MGD)	Peak Daily Flow[3] (MGD)
Existing Customers[1]	0.125	0.462	0.128	0.473	0.129	0.477
0-10 Year[2]			0.025	0.092	0.025	0.092
11-20 Year[2]					0.0248	0.0917
Total Flow	0.125	0.462	0.153	0.565	0.1788	0.6607

Notes:

1. Average Daily Flow is calculated based upon flow recordings at WWTP. Flow is based upon flow recordings from meter at WWTP.
2. Average Daily Flow is based upon house counts and population projections multiplied by 400 gallons per home.
3. Peak Hour Flow is calculated by multiplying Average Daily Flow by Peaking Factor (3.70).

SECTION 7: FORECASTS OF FLOW AND WASTE LOADS

Table 7-8 –Influent & Effluent Design Criteria

Parameter	Influent Characteristics	Effluent Design Criteria
CBOD	120 mg/l	30 mg/l
TSS	210 mg/l	30 mg/l
Ammonia-Nitrogen	70 mg/l	20 mg/l
Dissolved Oxygen		2 mg/l
Total Phosphorous		Monitor, mg/l
Total Nitrogen		Monitor, mg/l
Total Residual Chlorine		0.019 mg/l

Notes:

1. All influent characteristics based upon average daily DMR 2013-2014.
2. All effluent design criteria based upon Waste Load Allocation Request, June ##, 2015.
3. Effluent Design Criteria is the same for the May 1 – October 31 and November 1 – April 30 time periods per letter from DOW June ##, 2015.
4. Reliability Classification is Grade C.

KENTUCKY ENGINEERING GROUP, PLLC

June 2, 2015

Courtney Seitz
Kentucky Division of Water
Wastewater Municipal Planning Section
200 Fair Oaks Lane, 4th Floor
Frankfort, KY 40601

RE: Waste Load Allocation Request
City of Hawesville Regional Facility Plan

Dear Mr. Seitz:

This office is in preparation of Regional Facility Plan Update for the City of Hawesville in Hancock County. We are requesting that the Kentucky Division of Water (KDOW) to conduct a wasteload allocation for this proposed wastewater treatment facility.

The RFP includes a new WWTP to be constructed at the same site as the existing WWTP along Lead Creek with an initial treatment capacity of 300,000 gallon per day (GPD). The proposed wastewater treatment plant is located at approximately latitude 37° 54' 28.638" and longitude - 86° 45' 47.830" with the discharge point located at latitude 37° 54' 53.716" and longitude - 86° 45' 41.274". The proposed WWTP will be discharging into the Ohio River.

Currently, the existing WWTP has an average daily flow (ADF) of 0.128 MGD. Our recommendation is to construct a .3 MGD plant initially with the ability to expand the plant to 0.5 MGD at the site. The initial ADF would be 0.128 MGD with all potential collection system being constructed with a final ADF of 0.200 MGD. An attached map is included that shows the location of the proposed WWTP, existing WWTP and discharge point in relationship to the planning areas.

If you have any questions regarding the bid opening feel free to contact myself at 502.370.6551.

Sincerely,
KENTUCKY ENGINEERING GROUP, PLLC

Matthew R. Curtis, PE

Matthew R. Curtis, PE
Project Engineer

Cc: Ted Preston, Mayor, David McGuire, Public Works Director

P.O. Box 1034
Versailles, Kentucky 40383
Phone: (859) 251.4127
Fax: (859) 251.4137
Email: info @ kyengr.com
www.kyengr.com