

Issue Paper No. 7 – Flow Projections and Alternatives Development - Resolved
 Hardin County Water District No. 2
 Regional Wastewater Facilities Plan

This issue paper presents information regarding flow projections and alternatives development for service areas outside current municipal sewer service areas. The information presented in this issue paper will be discussed at Advisory Committee Meeting No. 6.

Defining Service Areas

In previous issue papers the areas of concern have been identified and prioritized by the Advisory Committee. These areas of need have been further refined in this issue paper into service areas. The following criteria were used in defining the service areas:

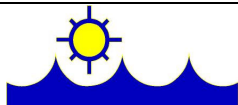
1. Watersheds that define natural drainage were considered.
2. Existing service areas were used to define boundaries.
3. Parcels were considered.

The final service area boundaries were drawn for each watershed or sub-watershed. In some cases, depending on the current land use, the service area boundary encompassed some areas from another watershed. This was done in the case of existing subdivided and developed land where it may be sewered as an entire subdivision prior to any other service being provided in the adjacent watershed. For some large vacant parcels, judgment was employed in identifying which watershed they would discharge into considering the entire tract could be subdivided and developed at one time. Some of these vacant parcels may never develop. For the purpose of establishing potential future flows, the potential error these assumptions yield is very small. Prior to the actual infrastructure being designed, the assumptions would need to be revisited to make sure the infrastructure is appropriately sized.

Figures 1, 2 and 3 show the watershed-based service areas with their assigned names. Table 1 identifies the newly named service areas and identified which areas of concern are included. The priority established in prior Advisory Committee meetings is also identified.

Table 1 – Service Areas

Service Area	Area of Concern	Priority
<u>Watersheds with Identified Needs (See Figure 1)</u>		
Upper Otter Creek	Boone Road	High
Pawley Creek	Rineyville	Medium
	Rineyville Elementary School	Medium
	LaVista Estates area	High
Brushy Fork	Burns-Deckard School Road	High
	Heartland Mobile Home Park STP	
	Industrial holding Vacant land	
Mill Creek Branch	Airview Estates (Package WWTP)	High
Buffalo Creek	Bardstown Road Area	Low
Upper Younger Creek	Springfield Road Area	Low
	Industrial holding Vacant land	
Middle Creek Branch	Thoroughbred Estates/Thousand oaks	High
East Rhudes Creek	Oxmoor Village	High
	Hodgenville Road Area	Medium
North Upper Nolin River	Gilead Church – Glendale Rd.	High
	Glendale Industrial Site	High
	Glendale Auto Truck Plaza STP	
	Petro Stopping Center STP	
Rose Run	Glendale – North Glendale Rd. Area	High
	East Hardin Middle School STP	



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Valley Creek	Industrial Area New Glendale Rd. Area	High High
Dorsey Run	Sonora Sonora Auto Truck Plaza STP	High
Sandy Creek	Upton	High
West Rhudes Creek	Cecilia	Low
Upper Shaw Creek	Smithersville	High
	Septage Receiving Point	High
Other near urban watersheds (See Figure 2)		
Lower Otter Creek		
Upper Pawley Creek		
Billy Creek		
Upper West Rhudes Creek		
Lower Valley Creek		
Nolin River		
Cox Run	Industrial holding Vacant land North Rest Area I-65 STP South Rest Area I-65 STP	
Upper Nolin River	Industrial holding Vacant land Glendale Children Home STP	Low
Jackson Branch		
Upper Valley Creek	Industrial holding Vacant land	
Clear Creek	Industrial holding Vacant land	
Upper Buffalo Creek		
Upper Freeman Creek		
Cedar Creek		
Mill Creek		
Rural Watersheds (See Figure 3)		
Lower Clear Creek	Colesburg	Low
Rolling Fork		
Younger Creek	Pearl Hollow Landfill	Low
Broadhead Run		
Middle Creek		
Copelin Valley		
Lower Sandy Creek		
Akers Valley		
Lower Nolin River	West Hardin Middle School System Lakewood Elementary School System Stephensburg Area	Low Low Low
Meeting Creek		
Rough River		
Blue Fork		
Flaherty		
Flippin Creek		



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The Advisory Committee will be asked to validate the assignment of watersheds to the above three categories and establish priorities where not previously established.

Population and flow projections for service areas

Issue Paper No. 6 included discussion about the various population projections for the county. Generally, it was concluded that the rate of growth to be used in this study should be twice the rate of growth predicted in the LTADD traffic analysis projections developed for the MPO. The accelerated rate of growth was supported by the recent number of building permits issued compared to the traffic analysis projections for the first few years. The traffic analysis projections were generally made based on census tract or subdivided census tract.

Other assumptions that were agreed to in Issue paper No. 6 were:

- the number of people per home is 2.5 (based on Census),
- the per capita wastewater flow will be 100 gallons per day (accounts for minor I/I and commercial/public flow),
- the vacant industrial areas should be allocated 1500 gallons per day per acre to allow for significant industrial growth, and
- the Glendale industrial tract 1530 acres and total initial flow allocation of 2.3 mgd.

The service areas overlap several census tracts. The current population in each area was approximated by using a lot count and 2.5 people per home. The population in 2030 was approximated by assigning a percentage of the predicted population growth by census tract (twice the traffic analysis projections) to each of the service areas. The percentage assumed was based on engineering judgment considering land use (existing lots) and overall acreage. The existing and projected populations are identified in Table 2.

The concept of a saturation population was considered. In considering what may happen beyond the 20-year planning window of this study, some assumptions were made. The assumptions were:

- 25% of the overall acreage within a service area would be developable. The undevelopable land would be used for roads, rights of way, parks, and account for land in the flood plain or with unsuitable topography.
- on the developable land, 3 homes per acre
- 2.5 people per home, and
- 100 gallons per capita per day.
- Vacant industrial land assumed 1500 gallons per day per vacant acre. Half of the available land will be developed within the 20-year planning period of this study.
- Saturation or build out will not be realized for many years after the 20-year planning period, but should be considered in sizing major gravity sewer infrastructure.

Alternatives Development

Now that the 'service areas' have been established, an array of possible alternatives can be considered. It is the intent that the Advisory Committee pare down the number of alternatives for each service area to a few, more practical ones for detailed consideration. Table 3 lists the full array of potential alternatives by service area.

▪ **WWTP Alternatives**

The inventory of municipal WWTPs has been discussed previously and the Advisory Committee has generally agreed that all four Hardin County WWTPs (Elizabethtown, Radcliff, Vine Grove and Ft. Knox) should be considered viable alternatives to provide treatment.



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In addition, previous discussions have been held between Upton, Sonora and Caveland Environmental regarding possibly pumping wastewater from these areas to Bonnieville and on down to the Caveland Environmental WWTP in Hart County. We are exploring the current feasibility of this approach with Caveland Environmental.

Another alternative for wastewater treatment for unserved areas of the County is the construction of one or more county owned WWTPs. The location and size of the facilities could be considered in this facilities plan. Some factors to be considered in siting a new WWTP discharge are:

1. The discharge must be a minimum of 5 miles upstream of any raw water intakes.
2. The discharge location should be in a significant stream or river that is not listed as an impaired waterbody or an exceptional water resource. KDOW will be consulted to establish a wasteload allocation to set discharge limits for any new facility.
3. Adequate land must be available for current and ultimate needs. Consideration should be given to the surrounding current and future land use. Land must be out of the flood plain.
4. The site should be close to the discharge location, if possible, to avoid pumping. If the site is remote from the discharge location, wastewater may need to be pumped to the facility and treated effluent may need to be pumped to the receiving stream.
5. The site selected needs to be free of environmental (floodplain, floodway, wetlands, contamination, endangered species), historical and archeological concerns.

While all of these criteria need to be considered in the final selection of a site, the most important criteria to be considered for the screening of alternatives is the 5-mile rule and finding a significant, non-impaired and non-exceptional water to discharge into.

Figure 4 identifies some possible locations for one or more county WWTPs. The identified streams, Nolin River, Otter Creek and Younger Creek meet the above criteria. The Advisory Committee will assist in identifying practical alternatives for consideration in this facilities plan.

▪ Rural wastewater solutions

Municipal wastewater treatment is not the practical solution for more rural areas. Alternative wastewater collection and discharge systems can be considered for these areas. One example of a type of wastewater collection and treatment system that can be cost-effective for clusters of residences is the recirculating sand filter followed by land disposal of effluent through drip irrigation. This type of system is beginning to gain acceptance in Kentucky and has been employed successfully in other states for years. The system operates by employing septic tanks at the residence and using a small-diameter collection system (gravity or pressure) for septic tank effluent. The effluent is then treated at a remote site using a recirculating sand filter (RSF). The RSF is a fixed film bacterial process that produces a good quality effluent. The effluent may or may not require disinfection with ultraviolet irradiation. The effluent from the treatment process is then applied to the land via a subsurface distribution system called drip irrigation. Permitting for such a facility is through the county health department and Kentucky Department of Public Health.

Other rural solutions may include:

- Lagoons where wastewater is held until evaporation.
- Peat Biofilters - Septic Tanks can be followed by a pump tank which disposes effluent through a series of pipes which trickle through a box filled with a mixture of peat fiber



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(undecomposed roots of bog cotton and bog sedges) and sand. This system is appropriate for individual homes which do not have adequate soil conditions for effluent disposal. It has been used in small residential developments. It can be used in a modular configuration for large systems such as schools. O&M is largely related to mechanical and electrical components related to pumping facilities.

- Package Treatment Plants - Conventional package wastewater plants are available from a variety of manufacturers. These systems consist of influent screening, settling tanks (clarifiers), aeration tanks with blowers, disinfection tanks and effluent disposal to a stream. O & M for these systems is more extensive, the plant needs daily monitoring and requires a certified operator.

Issues To Be Resolved:

The Advisory Committee is asked to comment on the service areas established in this Issue Paper. The Advisory Committee is asked to help define watersheds with needs, near urban watersheds and rural watersheds.

The Advisory Committee is asked to amend, correct or agree with population, flow and development assumptions to be used in the balance of the plan.

To further refine the evaluations in this study, the Advisory Committee is asked to establish the list of alternatives to be considered. Use Table 3 for this purpose.

Resolution:

The Advisory Committee generally agreed with the service areas presented in the Issue Paper. The Committee assigned the watersheds with identified needs to develop within 10 years, the near urban watersheds to be considered to receive wastewater service between years 10 and 20 and the rural watersheds to develop beyond year 20 if at all. The Advisory Committee asked that Flippin Creek be moved from a rural watershed to a near urban watershed.

The Advisory Committee supported the population and flow projections. The Committee commented that the projections may even be low given the recent BRAC recommendations for Ft. Knox.

The Advisory Committee narrowed down the potential list of alternatives to be considered in the plan. Table 3 has been revised according to the discussion by the Committee.



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Table 3 – Wastewater Service Options

Service Area	ETown WWTP	Radcliff WWTP	Vine Grove WWTP	Ft. Knox WWTP	Caveland Environmental	New South County WWTP	New North County WWTP	New East County WWTP	Local Subsurface Disposal System`	Do Nothing
Watersheds with Identified Needs (0-10 year needs)										
Upper Shaw Creek (Smithersville)		?								
Upper Otter Creek (Boone Rd. Area)										
Pawley Creek (Lavista Estate & Rineyville)										
Brushy Fork (Burns-Deckard School Rd.)										
Mill Creek Branch (Aireview Estate)										
Buffalo Creek (Bardstown Rd. Area)										
Upper Younger Creek (Springfield Road Area)										
Middle Creek Branch (Thoroughbred Estate)										
East Rhudes Creek (Oxmoor Village & Hodgenville)										
North Upper Nolin River (Gilead Church – Glendale Rd.)										
Rose Run (Glendale – North Glendale)										
West Rhudes Creek (Cecilia)										
Dorsey Run (Sonora)					?					
Sandy Creek (Upton)					?					
Valley Creek (Industrial Area)										



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Service Area	ETown WWTP	Radcliff WWTP	Vine Grove WWTP	Ft. Knox WWTP	Caveland Environmental	New South County WWTP	New North County WWTP	New East County WWTP	Local Subsurface Disposal System	Do Nothing
Other near urban watersheds (10-20 year needs)										
Mill Creek										
Lower Otter Creek										
Flippin Creek (moved from Rural)										
Upper Pawley Creek										
Billy Creek		?								
Upper West Rhudes Creek		?								
Lower Valley Creek										
Nolin River										
Cox Run										
Upper Nolin River										
Jackson Branch										
Upper Valley Creek										
Clear Creek										
Upper Buffalo Creek										
Upper Freeman Creek										
Cedar Creek										
Rural Watersheds (beyond year 20 needs)										
Lower Clear Creek										
Rolling Fork										
Younger Creek										
Broadhead Run										
Middle Creek										
Copelin Valley										
Lower Sandy Creek										
Akers Valley										
Lower Nolin River										
Meeting Creek										

