Unraveling the Maze:
A Study of Wastewater in Sherwood and North Little Rock

Joanne Liebman Matson (Chair)
Professor, Rhetoric and Writing

Mark Funk
Associate Professor, Economics and Finance

Forrest Payne
Instructor, Biology

James Youngquist
Executive Director, Institute of Economic Advancement

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University of Arkansas at Little Rock

UALR

DEPARTMENT OF
RHETORIC AND WRITING
DEPARTMENT OF EXCELLENCE

29 July 2014

Mayor Virginia Hillman and
Sewer Committee Chairman Amy Sanders
2199 E. Kiehl Avenue
Sherwood, AR 72124

Mayor Joe Smith and
Wastewater Commission Chairman K. W. Matthews
City Hall - 300 Main Street
P.O. Box 5757
North Little Rock, AR 72119-5757

Mayors and Chairmen:

Accompanying this letter are copies of the final report of the UALR Task Force that studied the feasibility of "collaborating services or merging" the wastewater utilities of Sherwood and North Little Rock. The study was initiated by the mayors of the two cities, who asked UALR to play a neutral role in assessing the collection and treatment of wastewater in Sherwood, Arkansas.

The Task Force found that having two separate utilities leads to confusion for customers, challenges for engineers, and an inefficient use of financial resources. We therefore strongly encourage the two cities to consider one of these alternatives: (1) unify the North Little Rock and Sherwood wastewater utilities into a single, consolidated entity; or (2) maintain two separate utilities but execute an inter-local agreement in which Sherwood wastewater *collection* is by Sherwood Wastewater Utility, and Sherwood wastewater *treatment* is by North Little Rock Wastewater Utility.

This study could not have been completed had Ellen Norvell and Marc Wilkins not been so generous with their time, expertise, and insights. On behalf of my colleagues, I thank them for their generosity. Whatever the two cities decide, I believe the citizens in both communities are fortunate to have such fine public servants.

I have included copies for the NLR Wastewater Commission and the Sherwood Sewer Committee. We would be happy to help in any further way, including meeting with these committees or facilitating an agreement.

Sincerely,

Joanne Liebman Matson, PhD, JD
Professor of Rhetoric and Writing

UNIVERSITY OF ARKANSAS AT LITTLE ROCK
2801 South University Avenue Little Rock, Arkansas 72204-1099
(O) 501.569.3160 (F) 501.569.8279

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Executive Summary

Wastewater service within the city of Sherwood, Arkansas, is completely interdependent with the North Little Rock Wastewater Utility. About three-quarters of Sherwood residents have their wastewater treated at North Little Rock Wastewater Utility's Five Mile Creek Treatment Plant, and about one-half of Sherwood residents have their wastewater collected by North Little Rock Wastewater Utility. There are thus three types of sewer customers within the Sherwood city limits: (1) residents defined as Sherwood customers whose wastewater is collected by Sherwood Wastewater Utility and treated by North Little Rock Wastewater Utility; (2) residents defined as Sherwood customers whose wastewater is collected *and* treated by Sherwood Wastewater Utility; and (3) residents defined as North Little Rock customers whose wastewater is collected and treated by North Little Rock Wastewater Utility.

This system leads to confusion for customers, challenges for engineers, and an inefficient use of financial resources. Thus, the two cities of Sherwood invited faculty at the University of Arkansas at Little Rock (UALR) to study the feasibility of "collaborating services or merging" their wastewater utilities into a single entity.

The UALR Task Force determined it would be in the best interests of the residents and utilities of both cities to proceed toward one of two alternatives:

> Alternative 1: Unify the North Little Rock and Sherwood wastewater utilities into a single, consolidated entity that operates north of the Arkansas River and that is not attached to either city.
>
> Alternative 2: Maintain two separate utilities but execute an inter-local agreement between Sherwood and North Little Rock in which Sherwood wastewater *collection* is by Sherwood Wastewater Utility; and Sherwood wastewater *treatment* is by North Little Rock Wastewater Utility at North Little Rock's Five Mile Creek Treatment Plant.

The first alternative of a single, consolidated utility would probably be the most efficient approach long-term, but the second alternative would meet most of the needs of the two cities and would offer Sherwood a means for retaining civic identity.

The Task Force believes it should be up to Sherwood and North Little Rock to determine which of these two alternatives to adopt. What is clear to the Task Force is that *one* of these options must be chosen. Otherwise, the utilities are not acting in their customers' and citizens' best interests.

II. Preface and Introduction

In spring of 2009 the mayors of the cities of North Little Rock and Sherwood asked the University of Arkansas at Little Rock (UALR) to study the feasibility of "collaborating services or merging" their wastewater utilities into a single utility.

This study is one of several in which UALR faculty and staff have been asked to undertake an expert neutral role in assessing infrastructure service provision by multiple local governments in the metropolitan Little Rock region.

The University took on this project and created a Task Force of five faculty and staff members from diverse disciplines. The Task Force ("Wastewater 2"[1]) drafted a preliminary report in early 2010, but decided, in consultation with the two cities and utilities, to wait to complete its recommendations until North Little Rock Wastewater Utility concluded its Master Plan with CDM Engineers. The Master Plan was completed in August 2011, but for a variety of reasons the UALR study was put on hold until spring 2013—at which time an additional question had to be asked: have the circumstances changed enough to warrant additional research or a change in recommendation?

The answer, perhaps surprisingly, was no. True, both utilities had undertaken many improvements over the last two years. But that is the nature of wastewater collection and treatment. There are always improvements required, whether because of changes in the weather or changes in population or changes in environmental requirements. And yet the basic facts of the relationship between the North Little Rock and Sherwood Wastewater utilities have not changed. The geography has not changed. The sewer pipes have not moved. The requirements for treatment have not been reduced.

One type of change may conceivably affect how this study is received. North Little Rock has a new mayor and its Wastewater Director has retired. Both cities' City Councils and Sewer Committees have had changes in membership.

Yet the Task Force believes the conclusions of the study are still sound—and it hopes the civic leaders in the two cities will consider the findings as they build on a shared commitment to offering efficient and effective services to their citizens.

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[1] "Wastewater 1" was a UALR study investigating the relationship of the Little Rock and North Little Rock wastewater utilities. Its conclusion was that it was not feasible nor would it be productive for those two utilities to consolidate.

III. Background

As a town develops, so does its sewer system, following an almost natural evolutionary course, helped along by key leaders and the geography of the region. This movement is toward consolidation. In North Little Rock and Sherwood, we see towns at different phases of that development.

North Little Rock, originally Little Rock's "eighth ward," became the independent city of Argenta in 1904, largely through the efforts of brothers William C. and James P. Faucette. While mayors, they were instrumental in establishing services such as electricity and sewage, convincing the voters to support bonds that created Sewer Improvement District 1 in 1914, which built the first pumping station and seven miles of storm and sanitary sewers emptying into the Arkansas River[2]. The first main emptying into the Arkansas River was 8 and a half feet in diameter.[3] Argenta became North Little Rock in 1917 and expanded through annexing existing neighbors such as Baring Cross, Levy, and Rose City, as well as newer developments such as Park Hill (built in the 20's and 30's). As the city grew, additional improvement districts were established and their sewers eventually tied in. All of these lines ultimately carried storm water and untreated sewage into the Arkansas River—the typical approach even in much larger cities during the first half of the 20th century. In 1905, for example, nationwide over 95 percent of untreated urban wastewater was discharged directly into waterways, while 20 years later the amount was barely improved: 88 percent of untreated urban wastewater was discharged directly into local waterways.[4]

Treatment plants were rare in the United States until the mid-20th century. The federal Water Pollution Control Act was first passed in 1948, becoming permanent legislation in 1956. Not until the 1965 Amendments was there federal legislation protecting water quality.[5]

Meanwhile, in North Little Rock, during the expansion of the 60's, Mayor William Laman proposed a $3,650,000 bond issue for sewer and drainage improvements as part of the "urban renewal" of North Little Rock.[6] In 1962, the North Little Rock City Council established the Sewer Department and appointed a five-person Sewer Committee to oversee its operation. Its first major act was to

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[2]Walter M. Adams, *A History of North Little Rock: The Unique City* (Little Rock: August House, 1986), 128.

[3] Adams, *History*, 122.

[4] Steven J. Burian, Stephan J. Nix, Robert E. Pitt, and S. Rocky Durrans, "Urban Wastewater Management in the United States: Past, Present, and Future," *Journal of Urban Technology* 7.3 (Dec. 2000): 49. DOI: 10.1080/106307300750058447.

[5] Burian, et al.; "Urban Wastewater," 53.

[6] Adams, *History*, 211.

construct the Faulkner Lake Treatment Plant, which is located on the north shore of the Arkansas River just west of what is now Interstate 440.

About a decade later, in 1972, North Little Rock completed its second treatment plant, the Five Mile Creek Treatment Facility, which opened the Lakewood and Indian Hills areas for development. This plant is east of Lakewood in the McAlmont area of North Little Rock. Later in the 1970's Faulkner Lake was upgraded to a secondary treatment plant with a 13.2 MGD capacity; and a third plant—White Oak Bayou—with 6.6 MGD was built in the western part of the city adjacent to Burns Park.

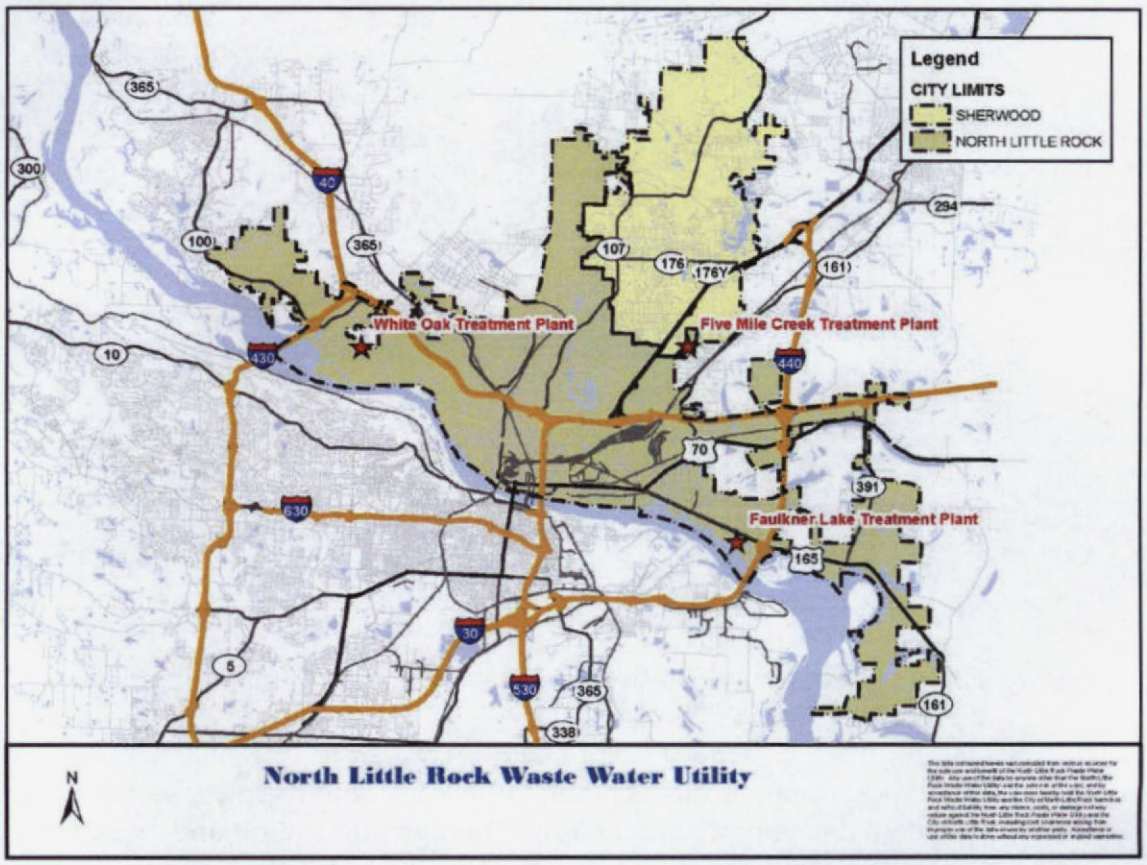


Figure 1. NLR Wastewater Treatment Plants (map provided by NLRWU)

The three treatment facilities each serve a separate drainage basin. Faulkner Lake's collection area encompasses the central and southern parts of the city, extending east along the Interstate 440 corridor; White Oak Bayou's collection area includes the western parts of the city, moving toward Maumelle; and Five Mile Creek's collection area encompasses the northern and northeastern parts of the city, including Indian Hills and parts of Sherwood.

Thus at this point in NLR's history, the city has a comprehensive sewer system, with three treatment plants operating at a total about 23 million gallons per day (MGD), and 664 miles of pipes serving 62,590 customers in North Little Rock and its environs.

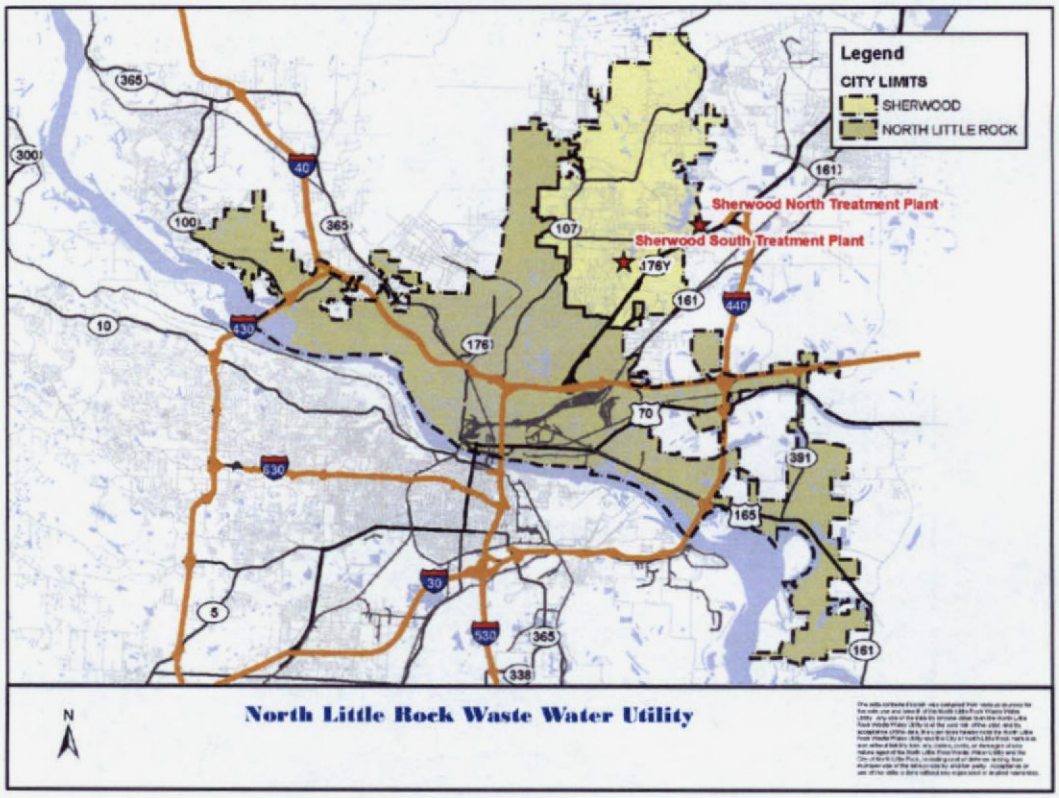


Figure 2. Sherwood Wastewater Treatment Plants (map provided by NLRWWU)

Sherwood is half as old as North Little Rock, and its sewer system reflects the more recent development of the town through annexation and expansion. Incorporated in 1948 when it had about 700 citizens, by 1970 Sherwood had 2754 citizens. Ten years later it had tripled to over 10,000 citizens, and by the 2010 census it had almost tripled again to 29,523.[7]

Currently Sherwood residents receive sewer services under three possible configurations: one in which residents are serviced jointly by Sherwood and North Little Rock, one in which residents are serviced entirely by North Little Rock, and one in which residents are serviced entirely by Sherwood.

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[7] "Sherwood (Pulaski County)," *Encyclopedia of Arkansas History and Culture*, http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=975.

The area where there are joint services consists primarily of "Old" Sherwood, which has its waste collected by Sherwood and treated by North Little Rock at Five Mile Creek. This area is the southeast section of Sherwood, bounded, roughly, by JFK Boulevard on the west, and a line extending from Club Road on the north through Rest Hills Cemetery. About a quarter of Sherwood residents are in this group.

The northern half of Sherwood includes four districts whose collection and treatment is entirely by North Little Rock. The sewer lines are owned and maintained by North Little Rock, and sewage is conveyed to Five Mile Creek for treatment. The lines in this area were originally constructed and serviced within improvement districts in Sherwood. However, prior to 1990 they were deeded over to North Little Rock.[8] The northern half of Sherwood also includes residents who have always had collection and treatment by North Little Rock. These customers were named the "District" and "North Little Rock" customers, respectively, in a 1990 court order that adjudicated customer divisions in the area. Just over half of Sherwood residents are in the District/NLR group, and they have both collection and treatment by North Little Rock.

Within these two larger squares (Old Sherwood and the District/NLR areas) are two smaller areas that are entirely serviced by the Sherwood Sewer Department, both collection and treatment. The Sherwood utility owns two plants that the city took over from improvement districts, the Indianhead sewer plant, now called the North Plant, with 1.175 capacity MGD; and the Pickthorn plant, now called the South Plant, with .6 capacity MGD. [See Figure 2.] The North Plant, originally built in 1977, is located north of Kiehl and west of U. S. Highway 167 on Algonquin Place, approximately 1000 feet east of Indianhead Lakes Estate subdivision. The South Plant is located south of Kiehl and west of U.S. Highway 167 at the end of Stafford Road. In total, Sherwood owns about 66 miles of pipes and treats about one-quarter of Sherwood customers' sewage. The other three-quarters of Sherwood have their waste treated by North Little Rock.

[8] Sewer Improvement District (SID) 234 was deeded to North Little Rock in 1976; SID 233 in 1980; and SID 212 in 1989. It is unknown when SID 236 was deeded over, but in 1998, an agreement was executed that dissolved SID 236 and acknowledged that wastewater "facilities" (meaning sewers, pipes and interceptors) had been taken over by North Little Rock Wastewater Utility.

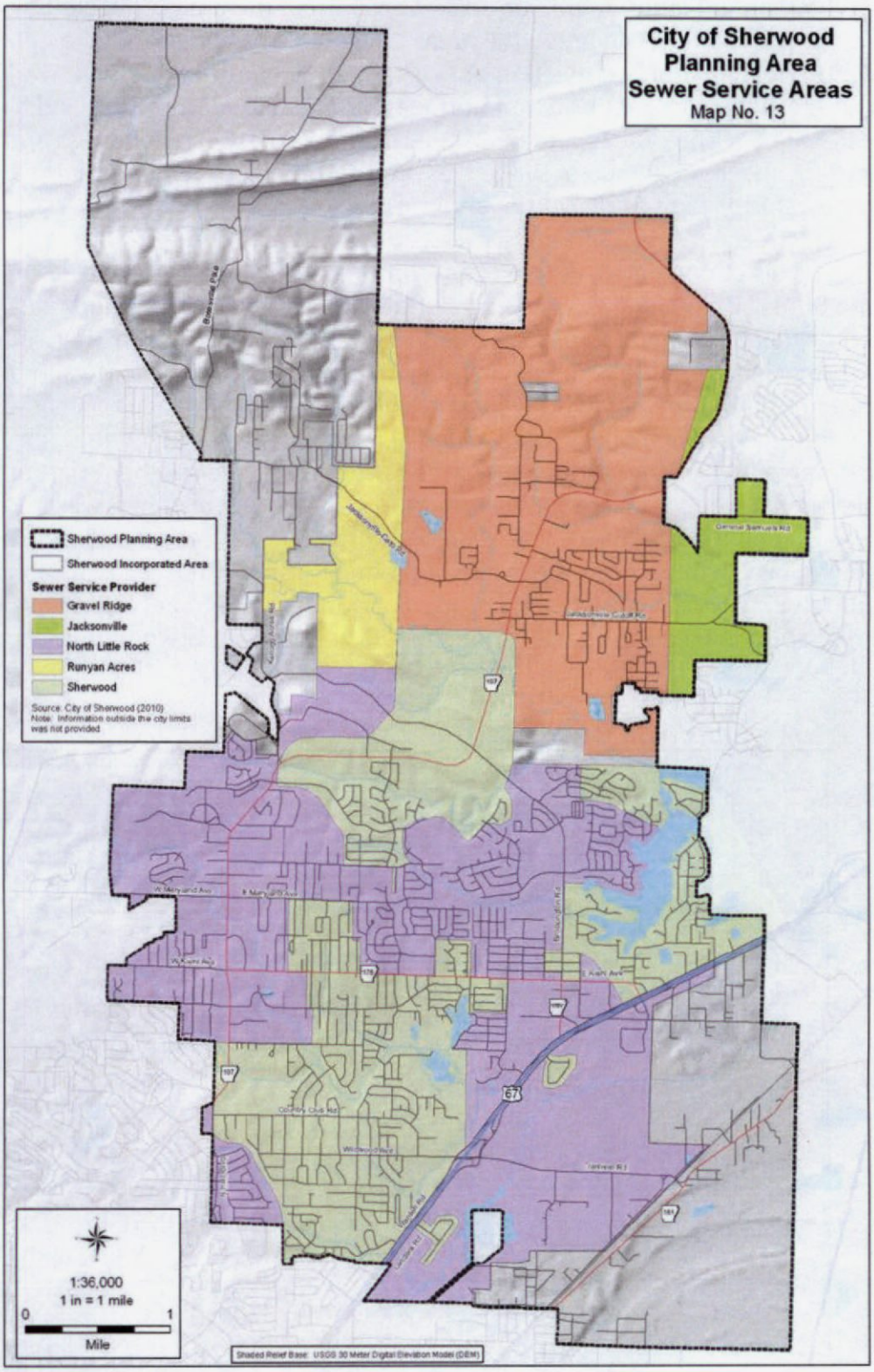


Figure 3. Sherwood Collection Districts (Map provided by SWWU)

On the map in Figure 3, the purple areas represent the areas collected by North Little Rock and the pale green the areas collected by Sherwood. The central section of Sherwood's collection area is treated in North Little Rock, while the two smaller sections to the north and northeast are treated at the North and South plants respectively. The orange and yellow sections represent Gravel Ridge and Runyan Acres, respectively. Gravel Ridge was annexed to Sherwood but maintains its own wastewater system, as does Runyan Acres.

This complicated system is a result of a 1990 Pulaski County court order (civ. 88-4160), which resolved years of debate over boundaries and rates. The court order identified the precise boundaries of the categories of Sherwood customers and established a payment system whereby the customers in the northern part of the city who were entirely North Little Rock customers were billed by North Little Rock (these were called "District" and "North Little Rock" customers in the 1990 order), while the customers in the southern part of the city, Old Sherwood, who were on Sherwood sewer lines but also had wastewater treated at Five Mile Creek, were called "Sherwood" customers. On the map below labeled Figure 4, you can see the improvement districts that are part of the North Little Rock Wastewater Utility, the original boundaries of Sherwood customers (in pink), and the Five Mile Creek collection basin within Sherwood (the black cross-hatched areas).

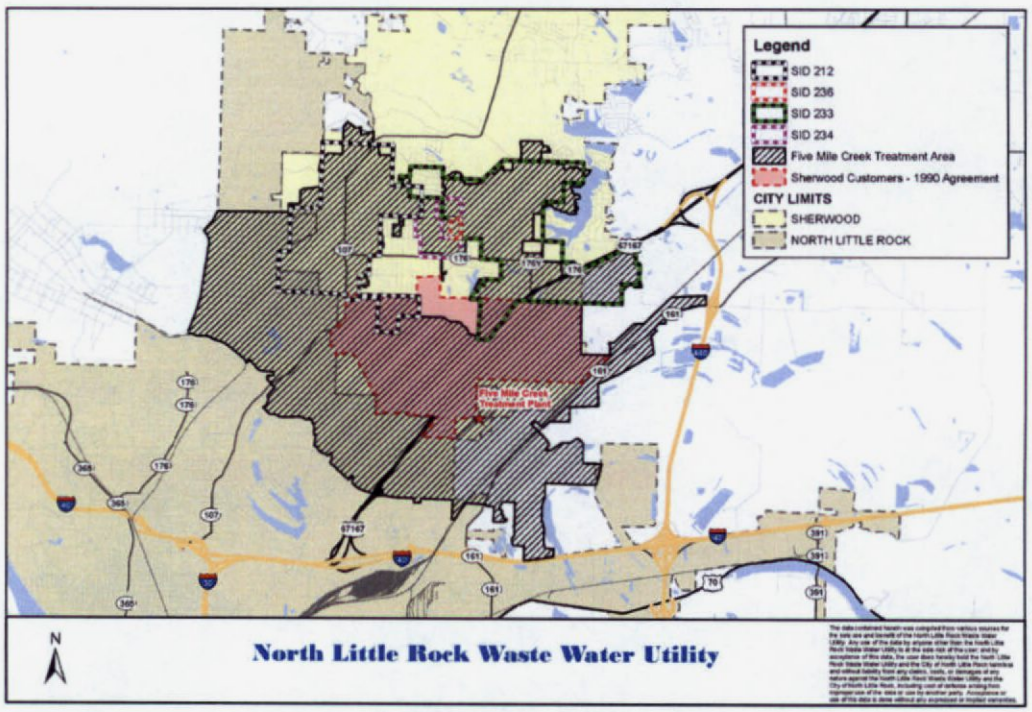


Figure 4. 1990 Court Order Boundaries (Map Provided by NLRWWU)

Based on the 1990 order, Sherwood pays North Little Rock Wastewater Utility an amount determined by formula in the court order for sewage treatment at Five Mile Creek. In the last two decades, Sherwood has acquired two treatment plants. Customers in the regions of the city near these plants are entirely Sherwood customers—both collection and treatment—and are billed by Sherwood,

This patchwork system creates problems administratively and environmentally; and for the last twenty-five years, the Sherwood City Council and Sewer Committee have discussed numerous approaches to consolidating as one utility—even going so far as offering to buy North Little Rock's Five Mile Creek Treatment Plant in 2003.[9] In 2000, hoping to move this consolidation forward, Sherwood passed a 5-year, 1% sales tax in 2000 "for the acquisition or construction (or both) for a City of Sherwood Sewer System." (Sherwood Ordinance 1470). These funds were used for the acquisition in 2002 of the Pickthorn sewer district and plant (now the South Plant) and the complete rebuilding of the North Plant, which had been acquired from the Indianhead district in 1995. The sales tax sunsetted in 2005, but its fund now holds about $9 million. During 2010, the Sherwood Sewer Committee debated how to use these funds. Some argued they could only be used to acquire and build treatment plants. Others argued they could be used for any infrastructure improvements, including maintenance and upgrades.[10] (Rayburn) As of 2013, this argument has now been resolved, and the funds are being used on evaluation and maintenance of the collection system, along with upgrades to the plants.

Because of the fragmented system, Sherwood residents pay different rates, depending on which city does collection and treatment. Those completely within the Sherwood system (the Indianhead and Pickthorn districts), and those whose collection is by the Sherwood system, currently pay $3.00 per 100 cubic foot (c.c.f), with a minimum of 400 cubic feet at $12.00/month. These rates have applied since December 2009. Those completely within the North Little Rock system pay the North Little Rock rate of $3.32 per 100 cubic foot (c.c.f.), with a minimum of $12.96/ month.[11]

Another problem created by the system is one of customer service. Sherwood customers with sewer problems are often confused about where to call for assistance. They receive their sewer bills in their Central Arkansas Water bills,

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[9] Warren Watkins, "Sherwood Experiencing Unprecedented Growth," *Sherwood Voice*, April 24, 2003, http://www.cityofsherwood.net/News/SherwoodExperiencingUnprecedentedGrowth.htm)

[10] Rayburn, Greg. "Battle Brewing Over Fate of $9 Million in Sewer Account System," *Sherwood Voice*, February 4, 2010, http://archives.arkansasnews.com/2010/02/04/battle-brewing-over-fate-of-9-million-in-sewer-account-system/.

[11] The North Little Rock Wastewater Utility has adopted a phased in schedule until 2016. The rate will rise approximately .20 per 100 cubic feet each year until 2016. The minimum, currently at $12.96, will rise approximately .75 each year until 2016. The Sherwood Sewer Commission has voted not to phase in rate changes.

like all of central Arkansas, but the bills do not indicate which sewer system they are a part of. Because a large part of Sherwood is on North Little Rock pipe, and 75% of Sherwood has its sewage treated in North Little Rock, chances are when a Sherwood citizen calls Sherwood City Hall for assistance, he or she will get what may be perceived as a run-around: "We're not responsible: call North Little Rock." Sherwood customers of North Little Rock Sewer Department have at times felt like poor step-children when requesting assistance. At best, they may feel frustrated at the additional level of bureaucracy they must navigate; at worst they may feel they have no way to hold the North Little Rock Sewer Department accountable—which in fact is true since they are not residents of North Little Rock.

Not surprisingly, over the years, there have been disputes about the rates and the boundaries for these different service areas. At times both Sherwood and North Little Rock have claimed--and billed--the same customers. The 1990 court settlement that is currently in effect was a result of a dispute that started in 1988, when North Little Rock proposed to raise its rates for Sherwood customers. After a year of negotiation, Sherwood and North Little Rock agreed Sherwood customers of North Little Rock would pay a pro rata share of the Five Mile Creek treatment. At the same time, they sued each other over customer boundaries.

More recently, a suit initiated by Sherwood in 2004 accuses North Little Rock of diverting wastewater to Sherwood, causing sanitary sewer overflows (SSOs) in Sherwood and making it impossible for a new development by Metropolitan Realty to tie into the Sherwood sewer system.[12] Indeed every new housing development in Sherwood, every residential request to move from septic tank to sewer, becomes a topic of discussion if not dispute: should the responsibility be Sherwood's or North Little Rock's?

The "diversion" from North Little Rock to Sherwood sewers, and indeed from Sherwood to North Little Rock sewers, is inevitable in a geographical area where two cities' sewer lines share the same collection basins and crisscross an area of approximately 20 square miles.

Both cities have had challenges meeting federal guidelines for collection and treatment, and both cities face a huge need to maintain and replace aging concrete sewer lines that crack and leak, causing sanitary sewer overflows, flooding, and even infiltration. Flooding waters and seeping pipes do not pay attention to court-ordered boundaries.

[12] This lawsuit is currently on hold.

IV. Engineering Analysis of the Wastewater Systems

A wastewater system is composed of two parts: (1) a collection system of pipelines that moves the wastewater from homes and industries, and (2) treatment facilities that prepare the wastewater for dispersal into the waterways—which in central Arkansas is always ultimately the Arkansas River. If these systems work well, customers are barely aware of their functioning. In order for that to happen, however, a cadre of highly trained specialists within the utilities, at governmental agencies like Arkansas Department of Environmental Quality (ADEQ), and in private engineering firms such as Crist and CDM, are constantly reviewing and analyzing the inputs and outputs to these systems. Weather has a significant effect on collection, and thus the system is inevitably volatile, requiring ongoing supervision, modifications, and upgrades. Heraclitus's well-known remark that nothing endures but change could be the watchword of the wastewater business. During the years of this study both Sherwood and North Little Rock have been ordered by ADEQ to make significant modifications; both Sherwood and North Little Rock have initiated significant upgrades in collection and treatment; and both Sherwood and North Little Rock have completed Master Plans that required several years of study and resulted in long-term plans.[13]

This chapter summarizes some of the analyses.

The Current Situation

At noted earlier there are currently two separate wastewater utilities: North Little Rock Wastewater Utility, which operates three treatment plants, Five Mile Creek, Faulkner Lake, and White Oak; and Sherwood Wastewater Utility, which operates two treatment plants: North and South. The collection system for Faulkner Lake and White Oak are wholly within North Little Rock. The collection system for Sherwood's North and South plants are wholly within Sherwood. But the collection system for the Five Mile Creek plant is in both North Little Rock and Sherwood. The locations of the five plants are shown in Fig. 5. As can be seen, North Little Rock's Five Mile Creek plant is actually within the city limits of Sherwood, while Sherwood's North Plant is on the border between Sherwood and North Little Rock

Discharging into the Arkansas River, Five Mile Creek Wastewater Treatment Plant operates with a design flow of 6.6 million gallons per day (MGD). This wastewater treatment facility, as well as the White Oak and Faulkner Lake facilities, is operating under Consent Administrative Order (CAO) LIS No. 10-218 issued by Arkansas Department of Environmental Quality (ADEQ) December 29, 2010. The

[13] The North Little Rock Master Plan was completed by Crist Engineers in 2009. CDM Engineers completed the Sherwood Master Plan in 2011.

CAO requires North Little Rock to reduce sanitary sewer overflows in the collection system.[14]

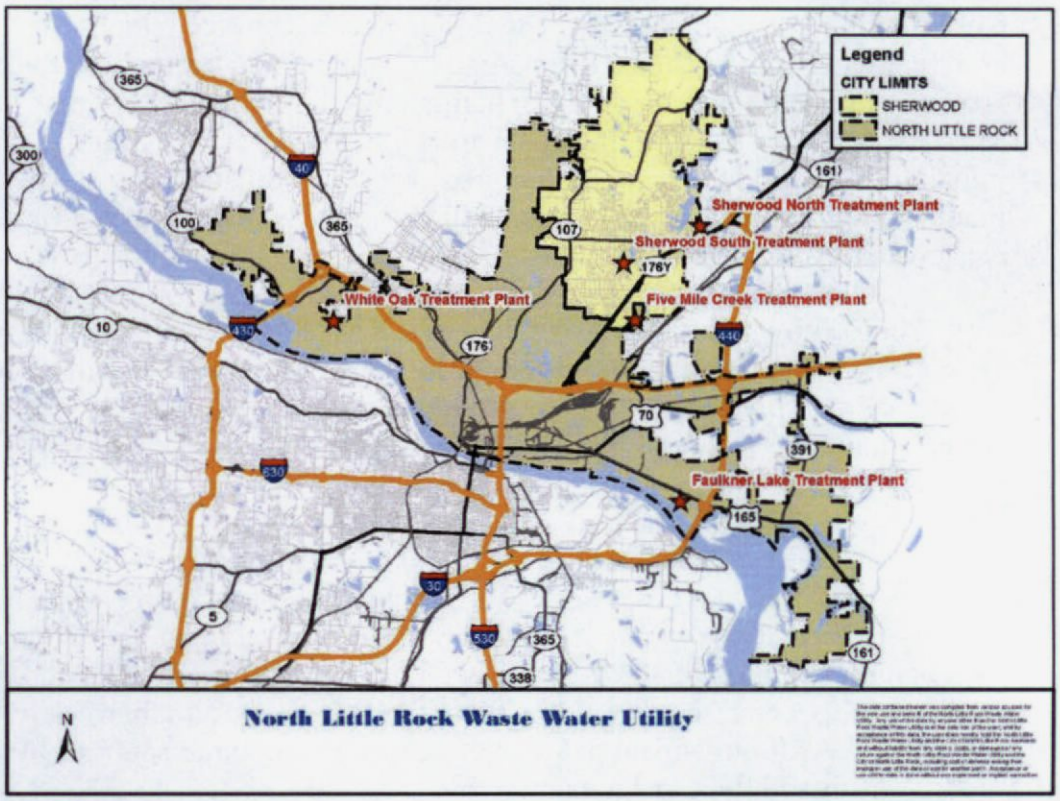


Figure 5. Treatment Plants in NLR and Sherwood (map provided by NLRWWU)

The North Little Rock White Oak Bayou Treatment Plant also discharges into the Arkansas River. North Little Rock is currently expanding White Oak, and the plant is permitted to expand its design flow from 4.25 to 8.5 MGD.[15]

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[14] The effective date of the Five Mile Creek permit (NPDES permit AR0020320) was June 1, 2012, and it expires on May 31, 2017. Treatment consists of bar screens, two aerated lagoons, a polishing pond, and chlorine disinfection. The standard pretreatment program for industrial dischargers to the facility is included.

[15] The effective date of the White Oak Bayou NPDES permit (AR0038288) was August 31, 2010, and it will expire September 30, 2015. The permit allows for a transition period as the White Oak facility adds two parallel aerated lagoons to the two parallel aerated lagoons already present, thus increasing the design flow from 4.25 to 8.5 MGD. The final treatment of the wastewater discharge will consist of bar screens, four parallel aerated lagoons and chlorine disinfection. Because the facility receives industrial wastewater, standard pretreatment language is included in the permit.

Like the White Oak Bayou and Five Mile Creek facilities, the Faulkner Lake Wastewater Treatment Plant discharges to the Arkansas River Basin. Its design flow is 12 MGD.[16]

The Sherwood Wastewater Utility has two wastewater treatment facilities: the North Plant and the South Plant. The design flow at the North Plant is 1.175 MGD, and the treated wastewater is discharged to an unnamed tributary of Kellogg Creek. From the unnamed tributary the discharge flows through Kellogg Creek to Bayou Meto to the Arkansas River. Bayou Meto is listed on the EPA's 303(d) list as an impaired water body because of the presence of dioxin and copper. The North Plant is not the source of the contamination, however, as it does not receive wastewater from a significant industrial user.[17]

The South Plant has a design flow of 0.6 MGD. The wastewater is released to Woodruff Creek, which in turn flows through Five Mile Creek to Bayou Meto to the Arkansas River. Because the design flow is less than 1.0 MGD, the South Plant is not considered to be a major municipal discharger.[18]

As noted earlier, the flow in the city of Sherwood is complicated. As a result of the 1990 court settlement, Sherwood and its environs at the time were divided into three categories of customers: Old Sherwood, District, and North Little Rock. Customers in the Old Sherwood area had sewer collection by Sherwood and treatment by North Little Rock. They were defined as Sherwood customers. The court order specified they would be billed by Sherwood, and then Sherwood would pay NLRWWU for treatment at Five Mile Creek in a manner set out by the court order. This is still the arrangement.

Customers in the "District" and "North Little Rock" categories, who had collection and treatment by North Little Rock, became customers of NLRWWU. The District customers were residents of Sewer Improvement Districts 212 (Sylvan Hills), 233 (Clayton Chapel), 234 (Oakbrooke), and 236 (Holly Hills). These improvement districts had previously contracted with NLRWWU to provide sewer

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[16] The effective date of the Faulkner Lake NPDES Permit (AR0020303) was April 1, 2008, and it expires March 31, 2013. The treatment system consists of bar screens, grit removal, primary clarifier, diffused air activated sludge, secondary clarifiers and disinfection by chlorination. Because this facility receives industrial discharges, it operates under standard pretreatment requirements.

[17] The North Plant operates under NDPES Permit AR0037176, effective September 1, 2012, and expiring August 31, 2017. Treatment at the North facility consists of bar screen, grit chamber, sequential batch reactors, post aeration and ultraviolet light disinfection. There is no wastewater from any significant industrial user.

[18] The South Plant operates under NDPES Permit AR0045608, effective May 1, 2010, and expiring April 30, 2015. The treatment system consists of a bar screen, activated sludge, clarification, post aeration and ultraviolet disinfection. The facility does not receive wastewater from industrial users.

service (both collection and treatment). The North Little Rock customers in the court order were those residents in 1990 who lived in Sherwood and had all sewer service provided by North Little Rock but didn't fall into the Sherwood or District categories. The court order specified they were to be billed by North Little Rock at the same rate as residents of North Little Rock.

At the time of the court order, there were no Sherwood treatment facilities. But since 1990, Sherwood has acquired the North and South treatment plants from the improvement districts (Indianhead and Pickthorn, respectively) that originally built and operated them. Additionally, new housing developments have been built, and they have become part of either the Sherwood or North Little Rock sewer systems.

Thus, we can currently describe three categories of customers in Sherwood, which are slightly different from the three categories described in the 1990 court order:

Current Categories	**1990 Court Order Categories**
Old Sherwood (Sherwood collection; NLR treatment; Sherwood billing)	*Old Sherwood*
Northern Sherwood (NLR collection & treatment; NLR billing)	*North Little Rock* *District*
Sherwood (Sherwood collection & treatment; Sherwood billing)	

Table 1: Comparison of Current and 1990 Court Order Categories

As in the court order, Old Sherwood, the southeast section of the city roughly bordered by JFK on the west and a line extending along Club Road east to Rest Hills Cemetery, has collection by the Sherwood utility and treatment at North Little Rock's Five Mile Creek. They are considered Sherwood's customers and are billed by the Sherwood utility. For most of those customers, the Sherwood utility then pays the NLR utility for treatment. (See the cross-hatched pink area on Figure 6). About a quarter of Sherwood residents fall into this group.

The northern half of Sherwood, making up just over half of Sherwood residents, has collection *and* treatment by North Little Rock Wastewater Utility. (See the cross-hatched yellow areas on Figure 6). These customers include both the District and North Little Rock categories of the court order. They continue to be billed by North Little Rock at the same rates as North Little Rock residents.

The current third category of customers was not outlined in the 1990 court order. Sherwood has two areas where both collection and treatment are by the Sherwood utility. Areas on the map in Figure 6 that are not crosshatched have their sewage treated at Sherwood's North and South plants. This includes areas that

were included in the 1990 agreement (in pink) and have been added since then (in yellow). (The yellow areas at the northern most part of the map are recent Sherwood annexations, and collection and treatment is not the responsibility of Sherwood.)

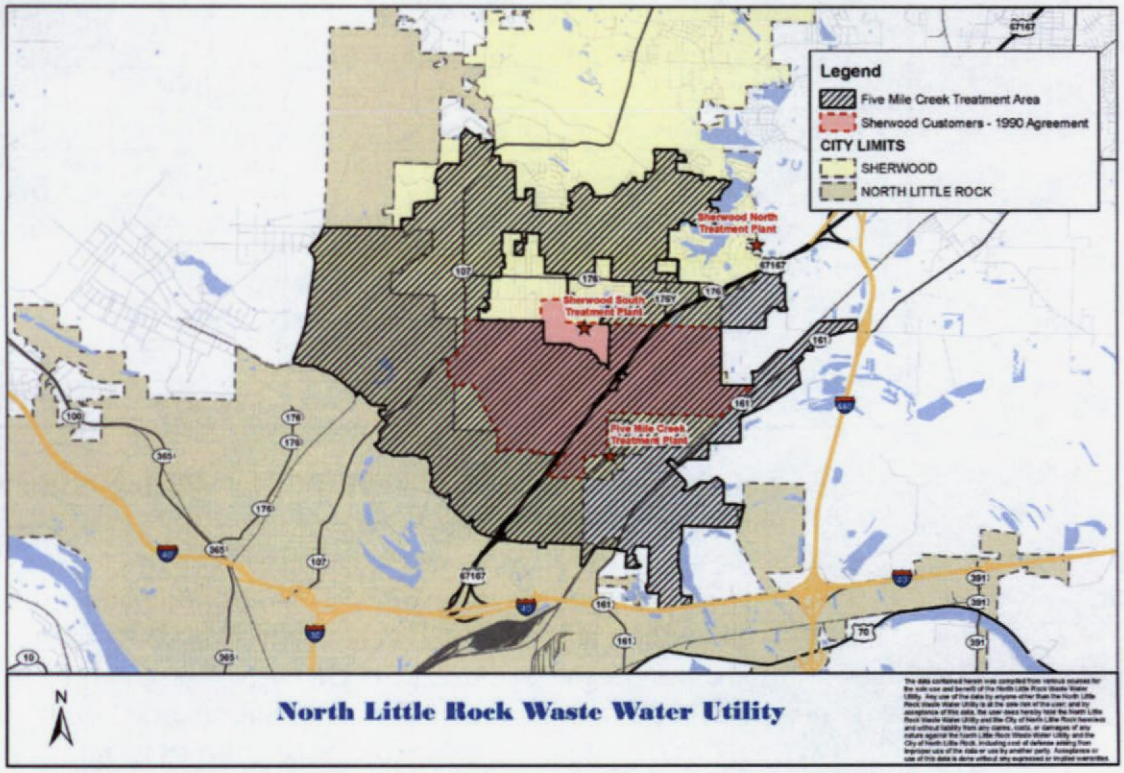


Figure 6. Sherwood Collection and Treatment Areas

In Sherwood, residents whose collection and treatment are by North Little Rock Wastewater (Northern Sherwood category in Table 1) are considered North Little Rock customers and are billed at the North Little Rock rate of $3.32 (as of 2013) per 100 cubic feet (c.c.f). Residents whose collection is by Sherwood Wastewater Utility are considered Sherwood customers and are billed at the Sherwood rate, which has been $3.00 per c.c.f since January 2010. About a half of those "Sherwood" customers then have their sewage treated at Five Mile Creek in North Little Rock, for which the Sherwood utility pays the North Little Rock utility according to the formula set by the 1990 court order. As per the 1990 court order, they are still called Sherwood customers because Sherwood does their collection. The formula in the court order is designed to "accurately determine the percentage of usage attributable to Sherwood customers." Based on water usage, the formula divides the usage of water by Sherwood customers of Five Mile Creek by the total usage of *all* customers of Five Mile Creek. This results in a percentage "p," which is then multiplied by an amount "t," which reflects the total cost of Five Mile Creek.

Table 2 identifies the multiple categories of Sherwood customers:

Treatment Plant	Customer Class (who does billing and collection)	Number of Customers	Estimated Population	Percent of Total Number of Customers
North	Sherwood	1,054	2,551	10
South	Sherwood	1,460	3,533	14
Five Mile Creek	Sherwood (Old Sherwood)	2,386	5,774	23
	North Little Rock (defined as District & NLR customers in 1990 court order)	5,571	13,482	53
Total		10,471	25,340	100

Table 2. Distribution of 2008 Sherwood Customers by Customer Class and Treatment Plant[19]

The Sherwood collection system consists of approximately 346,913 linear feet (66 miles) of mainline gravity sewer, some of which, as stated above, is sent to North Little Rock for treatment and some kept in Sherwood for treatment.[20] There is also approximately 603,529 linear feet of NLR pipe in Sherwood.[21] Both utilities' collection systems within the city of Sherwood are at times tributary to the other, leading to SSOs caused by both utilities. A schematic (Figure 7), created by the engineering firm Pipeline Analysis when they were analyzing flow for Sherwood in spring 2009, provides a graphic representation of the current situation regarding the collection flow in Sherwood.

[19] Sherwood customer data provided by Crist Engineers, "Report of City of Sherwood Wastewater System Master Plan," August 2009, pg. 5-1.

[20] Sherwood data provided by the Pipeline Analysis report, "Final Report Executive Summary Sanitary Sewer Inflow/Infiltration Analysis," 2009, pg. 1.

[21] Data provided by Marc Wilkins, August 20, 2013.

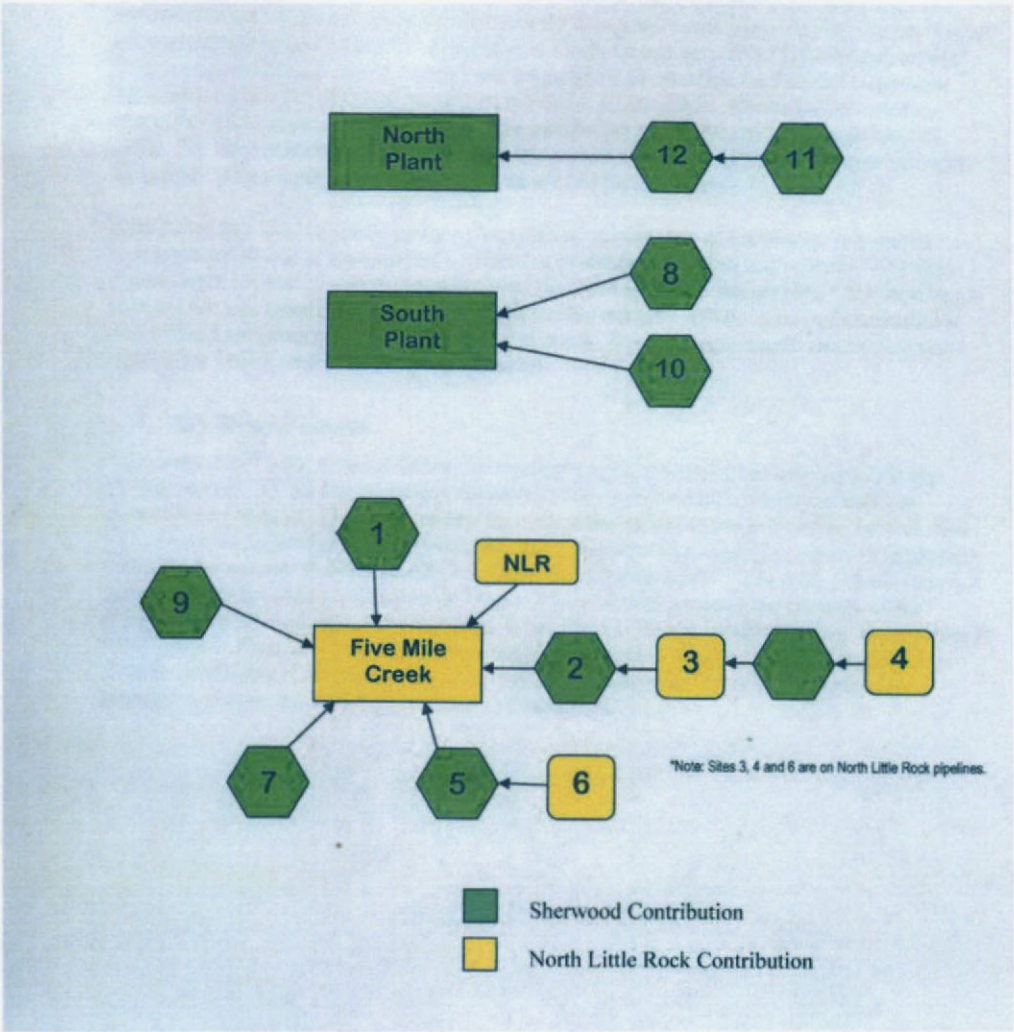


Figure 7. Schematic of Sherwood Wastewater Flow (from page 4 of summary of Pipeline Analysis flow monitoring study).

Each of the numbers in the diagram represents a temporary flow meter site set up by Pipeline Analysis and marks the boundary of a basin. All sites are in Sherwood. By "North Little Rock Contribution," they mean pipes in the *city* of Sherwood that are *owned* by North Little Rock.

Planning for the Future: Treatment Plants

Five Mile Creek in North Little Rock

The triggering question for this study was whether the two cities' wastewater utilities should consider "collaborating services or merging." To answer this question, the utilities must consider not only the current situation but also the future

sewage needs of both communities, including the projected needs for the future with population and industrial growth.

It is obvious from the current relationship of the two utilities that one focus of any collaborative plan must be on Five Mile Creek and the collection system that feeds it. This is the one part of the system that is jointly used and has come under court order because of overflow problems.

The regulatory issues facing the North Little Rock Waste Water Utility include restrictions and demands that are contained in their permit issued by ADEQ in conjunction with the federal EPA. Even if the relationship between the utilities of Sherwood and North Little Rock does not change, the Five Mile Creek plant has been due for major maintenance and an upgrade in capacity.

Five Mile Creek is a conventional aerated/facultative lagoon treatment facility. It is currently rated for a design flow of 6.6 MGD and a peak flow of 12.4 MGD. The plant includes the following:

- Influent screening (two mechanical bar screens
- Influent Pump station
- Influent Flow Metering
- Aerated ponds (2) – earthen, each with 4-25 HP aerators and 1-40 HP aerator. Each lagoon is 5.15 MG in volume with an effective depth of 12-ft.
- Partially Mixed Aerated Facultative Ponds – single large earthen pond with a volume of 66 MG and an effective depth of 7-ft.

Five Mile Creek plant has gone the longest since a major upgrade of any North Little Rock facility. According to Technical Memorandum #4 by CDM (August 2009), flows have increased to the point where the overall plant capacity must be increased. Originally constructed in 1972 as a conventional aerated/facultative lagoon treatment system, Five Mile Creek was upgraded in the mid-1990s with the addition of a third influent pump, new bar screens, and an increase in the operating level of the facultative lagoon. This lagoon was partitioned into four zones using floating baffle curtains, and mechanical aerators were supplied in each zone. Also included in the upgrade were a new chlorine contact chamber, chlorine scrubber and a dechlorination chamber.

CDM projected the following population changes for the Five Mile Creek collection basins (see Table 3):

Basin No.	Description	Total Acres	Population 2010	Population 2030
1	Inside NLR	13,258	18,500	20,150
2	Areas in Sherwood flowing to 5MC	8,834	20,500	26,200
3	Additional growth north	1,200	0	6,000
Total		21,292	37,000	52,350

Table 3: Projections for Population Growth within Five Mile Creek Basin

As can be seen in Table 3, even without a change in the physical areas of Sherwood that flow to Five Mile Creek for treatment, Sherwood is on track to exceed North Little Rock in population, although the total acreage in Sherwood remains roughly 41% of that of North Little Rock.

The flow changes that CDM projected for Five Mile Creek (including the current Sherwood areas flowing there) are in Table 4.

Year	**Design Flow 100 gpcd (gallons per capita per day) – Ten States Standard**	**Design Flow 125 gpcd – ADEQ Standard**
2010	4.1 mgd	5.1 mgd
2030 (20-year projections)	5.7 mgd	7 mgd

Table 4: Projections for Flow Changes within Five Mile Creek Basin

Thus CDM determined a need to enlarge Five Mile Creek. The greater part of the growth would be from Sherwood and north since Sherwood has more room for growth than North Little Rock, which is basically land-locked.

Five Mile Creek is currently a conventional aerated/facultative lagoon system rated for a design flow of 6.6 MGD and a peak flow of 12.4 MGD. Under North Little Rock's Master Plan (adopted August 2011), Five Mile Creek is being converted to a Sequencing Batch Reactor (SBR) system with a design flow of at least 7.4 MGD. Thus it will be able to handle the projected increases in the current NLR system.

The section of the North Little Rock Master Plan about the treatment plants (Technical Memorandum #5) offered two options for upgrading Five Mile Creek, converting to the SBR system or expanding the current lagoon system. The SBR system was selected for its reduced power costs ($264,000 a year), its reduced

environmental impact, its ease in operation, and its capacity for future expansion—up to 10 MGD.

Because the possibility of collaboration was already under discussion when the North Little Rock Master Plan was drafted, the CDM engineers considered the implications of North Little Rock treating *all* of Sherwood's wastewater. The CDM engineers determined that the proposed future capacity for Five Mile Creek of 7.4 MGD would suffice should Sherwood's South Plant be decommissioned and its sewage treated at Five Mile Creek, and that a future capacity of 8.2 would suffice should both of Sherwood's treatment facilities be decommissioned and their sewage treated at Five Mile Creek. In 2012, North Little Rock began the first phase of their five-phase 20-year Capital Improvement Plan. Phase 1 is budgeted at $21 million and involves upgrades in several pump stations and an extensive sanitary sewer evaluation study (SSES). The upgrades at Five Mile Creek are part of Phase 2 and will begin around 2018.

The North and South Treatment Plants in the City of Sherwood

Sherwood's November 2008 Consent Administrative Order (LIS 08-135) requires the city to correct hydraulic and treatment deficiencies in its plants.

The improvements required by ADEQ are significant. Regardless of whether NLR and Sherwood decide to collaborate, Sherwood must upgrade the plants to meet the ADEQ order. Indeed, during spring 2013 Sherwood solicited bids to begin these upgrades. According to the Sherwood Wastewater Master Plan developed by Crist Engineers in 2009, the most cost-efficient approach to these upgrades would be Alternative 1, which calls for converting the plants for use as flow-rate equalization basins before conveyance to Five Mile Creek. The other alternatives proposed in the Master Plan are (Alternative 2) to decommission the South Plant and send its waste to Five Mile Creek while retaining and upgrading the North Plant; or (Alternative 3) to retain, upgrade, and expand both plants. The alternatives also addressed the recently annexed Gravel Ridge—what the Master Plan called the "North Area." In Alternative 1, North Area customers would have wastewater treated in North Little Rock at Five Mile Creek. In Alternative 2, North Area customers would have wastewater treated at the upgraded and expanded North Plant, while in Alternative 3, north area customers would have wastewater treated at either Five Mile Creek (Alternative 3-1) or an upgraded and expanded Gravel Ridge treatment plant (Alternative 3-2).

According to the Sherwood Master Plan, the following long-term improvements would be required at the Sherwood plants for the plants to remain Sherwood's treatment plants:

Long-Term Improvements to North Plant:

- Increase the capacity of the existing plant pump station and provide for variable rate pumping
- Revise the equalization basin: increase the water depth, provide aeration and mixing of basin contents, and include a means returning basin contents to the headworks at an adjustable rate.
- Provide a flow management system at the headworks to permit flow-rate peaks to discharge to the equalization basin. This flow management system should include the ability to control operation of remote pump stations from the plant control system; install influent flow meter.
- Add a second mechanical bar screen.
- Provide a means of flow division between existing and future SBR basins.
- Modify the 2-basin original project (1997) SBR to operate as a single basin; verify that this SBR is in good operable condition; replace equipment and controls as necessary.
- Provide standby blower(s); anticipate replacement of SBR recirculation pumps and all blowers.
- Reconstruct the sludge storage lagoon to provide adequate capacity, adequate freeboard, and decant facilities; as an alternative, add sludge dewatering facilities to replace the on-site lagoon storage of waste sludge.
- Construct high-water protection for lower plant facilities.

Long-Term Improvements to South Plant:

- Convert existing influent pump station to variable rate pumping; install influent flow meter
- Revise the equalization basin: increase the water depth, provide aeration and mixing of basin contents, and include a means returning basin contents to the headworks at an adjustable rate.
- Provide a flow management system at the headworks to permit the diversion of flow-rate peaks to discharge to the equalization basin.
- Install duplicate bar screens (replace existing).
- Install grit removal system
- Replace aeration system including blowers
- Rehabilitate existing integral clarifiers; or consider replacing integral clarifiers with external clarifiers
- Improve area lighting and access to various plant facilities
- Revise the sludge storage lagoon to provide adequate freeboard and a means of decanting the surface waters to the plant headwork

Because of the scope required to upgrade the North and South plants to meet ADEQ standards, and because of the increased maintenance and operations the upgraded plants would require, the Master Plan recommended the first alternative—that all Sherwood wastewater be treated at Five Mile Creek—both because of engineering and cost. This alternative allows them to take advantage

of gravity flow to Five Mile Creek, while the other alternatives require more extensive pumping and expensive upgrades. The cost of Alternative 1 they project at just under $12 million, while the cost of Alternatives 2, 3-1, and 3-2 at $21.5 million, $18 million, and 29.1 million, respectively. As noted previously, Alternative 2 involved decommissioning the South Plant but retaining and upgrading the North Plant, while alternative 3 involved retaining and upgrading both plants. The reason why Alternative 3-1 was less than Alternative 2 is that the Master Plan assumed in 3-1 that treatment of North Area customers (the newly annexed Gravel Ridge) would occur at Five Mile Creek. In contrast, Alternative 3-2 would require Sherwood to absorb the sewer system and update the treatment plant in Gravel Ridge.

According to Sherwood's engineer, the 2013 upgrades, which are primarily to the equalization basins, are the minimum needed to comply with the ADEQ order and do not reflect a long-term capital commitment. Should there be a decision to collaborate between the two cities so that all Sherwood waste would be treated in North Little Rock, these improvements would not have been wasted. They could be incorporated into the long-range goal of consolidating all Sherwood treatment at Five Mile Creek.

The Storm Water Overflow Problem

The City of Sherwood

Weather, as noted above, plays a major role in wastewater collection. The City of Sherwood was placed under a Consent Administrative Order (LIS No. 08-135) by ADEQ effective January 2009, and required to reduce Rain Dependent Infiltration/Inflow (RDII). These RDIIs lead to sanitary sewer overflows (SSOs). For example, there were 95 overflows in the Sherwood collection areas during 2008. Of these, the majority (63) were the result of line blockage, six (6) the result of line breaks, and two (2) the result of manhole blockage. Rain was a major cause of 23 overflows. In compliance with the CAO, in the spring of 2009 Sherwood contracted with Pipeline Analysis to study its entire collection system.

The major issue with wet weather inflow is the inability of the collection system to transport the peak flow due to the influx of extraneous infiltration/inflow. Infiltration occurs when deteriorated sewer lines allow groundwater to enter the collection system through defects such as open joints and broken pipe. Inflow is similar, but applies to rainwater, which enters the system through defects such as broken yard drains and holes in manhole covers.

Peak flows generally do not have long durations, but even short durations may create surcharge infiltration/inflow and the potential for SSOs (Sanitary Sewer Overflows) and an upset in the treatment plant process.

Figure 8 presents a summary of peak flow rates recorded in 2009 compared to a representative average dry weather day. Peak flow rates are a qualitative measure of the impact of wet weather on the collection system. Peak flow can be affected by bottlenecks in the system due to inadequate capacity, roots, broken pipe, etc. In addition, the peak flow rate will normally be reduced due to pumping stations equalizing flows (cutting off peak flow rates). High peak flows will also create elevated depth of flow in the pipelines. Surcharging was observed during the Pipeline Analysis flow monitoring study in spring of 2009 at all Sherwood meter sites except sites 5 and 11.

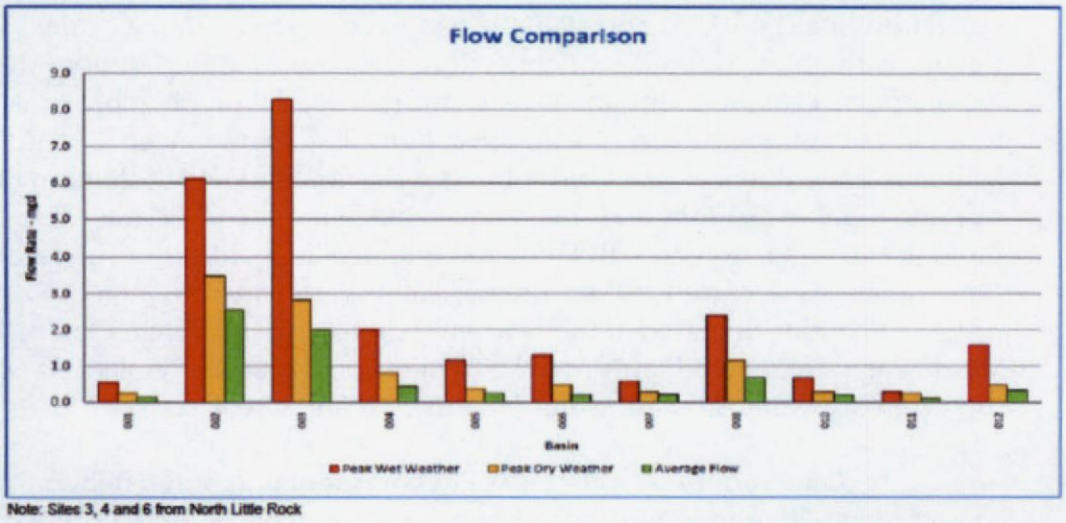


Figure 8: Dry Weather versus Wet Weather Peak Flow Rates[22]

The amount of wet-weather induced infiltration/inflow is highly variable and dependent on soil moisture conditions prior to the rainfall event. The data presented in the Pipeline Analysis report, for example, was based on a higher than normal rainfall season. The normal annual precipitation for the area is 50.86 inches, which, pro-rated for the duration of the study, means that 11 inches of precipitation would have been expected. In fact, during the time period, 18.77 inches were recorded, or 70% more than normal.

Without rehabilitation, the rate of extraneous water that enters the collection system will increase over time. Pipes will continue to deteriorate and allow additional RDII to enter the system. Periodic rehabilitation will reduce (but not eliminate) RDII, restore system capacity, and extend the life of the underground assets. Thus the ADEQ order requires Sherwood to

[22] This is Figure 8 in the Sanitary Sewer Evaluation Study: Wastewater Flow Monitoring Final Report prepared by Pipeline Analysis for Sherwood in 2009.

study their lines and develop a plan for rehabilitation and regular maintenance.

North Little Rock

North Little Rock also has had trouble with Sanitary Sewer Overflows (SSOs), and is currently under Consent Administrative Order (CAO) LIS No 10-218, which was issued to the City of North Little Rock with an effective date of December 29, 2010. The three North Little Rock plants were experiencing dry weather and wet weather sanitary sewer overflows (SS0s) and exceeding effluent characteristic limits. The Faulkner Lake facility, with approximately 334 miles of collection lines and 15 pump stations, had experienced 126 SSOs; the White Oak Bayou, with about 120 miles of collection lines and 15 pump stations, had experienced 111 SSOs; and the Five Mile Creek facility, with approximately 210 miles of collection lines and 14 pump stations, had experienced 47 SSOs. Violations of effluent characteristic limits were noted for fecal coliform (30 day average number /100mls and seven day average number /100 mls), five-day biological oxygen demand (BOD5), and total residual chlorine. The fecal coliform limit violations occurred at the Faulkner Lake Wastewater Treatment Plant. The BOD5 violations occurred at the Five Mile Creek and the White Oak Bayou Wastewater Treatment Plants and the total residual chlorine violations occurred at the White Oak Bayou Wastewater Treatment Plant.

The CAO required North Little Rock to submit a comprehensive Wastewater Master Plan with a milestone schedule within 180 days of the effective date of the CAO. The Wastewater Master Plan was to address a Capital Improvement Plan; a Sewer System Evaluation Survey; a Sewer System Evaluation System, Pumping Station, Capacity Assessment, and Hydraulic Model Evaluation Report; and a Collection System and Wastewater Treatment Plant Remedial Measures Plan. The Capital Improvement Plan was to list all improvements needed to eliminate violations. The Sewer System Evaluation Survey required the services of a licensed engineer in the State of Arkansas to develop a plan for conducting the Sewer System Evaluation Survey. The Sewer System Evaluation System, Pumping Station, Capacity Assessment, and Hydraulic Model Evaluation Report was to include a thorough analysis of historical and current flow monitoring, inspection, rainfall and any other data pertinent to developing the Collection System Remedial and Wastewater Treatment Plant Measure Plan. In turn, the Collection System Remedial and Wastewater Treatment Plant Measure Plan was to identify measures to achieve adequate capacity which was defined as "the capacity needed to collect, convey, and treat anticipated peak wet weather flows without SSOs, bypasses, and/or overloading."

In response to the CAO, North Little Rock has developed a systematic approach to evaluating and rehabilitating its collection system, including the parts in Sherwood. NLR has prioritized the areas to work on in the collection system

based on the number and intensity of SSOs. They are currently working on Levy and Baring Cross, and when they're done they will move on to Lakewood and Rose City. The final area to work on is the Sherwood area.

Conclusion

Sherwood and North Little Rock have had intertwined sewer systems for many decades. Because North Little Rock had a more mature system at the time Sherwood was developing during the 1970s and 1980s (Five Mile Creek was initially completed in 1972), many Sherwood neighborhoods turned to the North Little Wastewater Utility when they moved off septic tanks or sought to tie improvement districts into a larger municipal system. The result is a collection system in Sherwood that is not contiguous with city boundaries. Both North Little Rock and Sherwood have treatment facilities that need upgrades and expansion to meet the needs of current and future customers. Sherwood's North and South plants, originally built as neighborhood facilities, require significant upgrades and expansion to serve current customers and meet projected needs. Then, once expanded, they will require significant resources to operate and maintain them. North Little Rock's Five Mile Creek, while also needing upgrades and expansion, was originally designed to allow such expansions.

V. Financial Analysis

Since the two utilities employ different methods of organizing and presenting the relevant data, a direct comparison at a detailed level is not possible. However, the available information does allow a description of the current financial health of the utilities and a comparison of their overall costs.

The financial information for Sherwood Sewer Commission was taken from the Sewer Commission's financial statements audited by Bell, Foster, Bowman, Fleming, PA, Certified Public Accountants for year-end 2007 and from the City of Sherwood Waste Water Utility 2009 Budget. The financial information for the North Little Rock Waste Water Utility was taken from the Utility's financial report as audited by EGP, PLLC, Certified Public Accountants and Consultants, for the year end 2007 and 2008, and from the North Little Rock Waste Water Utility Budget for 2009. Where applicable, the data have been updated with publically available information.

Sherwood Finances

At year-end 2007, the Sherwood Sewer Commission had $1.3 million of unrestricted cash and certificates of deposit, with another $9.7 million in cash and CD's restricted for use in improving the sewer systems and /or retiring bonds payable. These restricted funds were generated by the 1% sales tax earmarked for sewer improvements (the tax expired in 2005). Capital assets totaled $9.2 million, with total assets of $20.5 million. The unpaid principal balance for bonds outstanding at December 31, 2007 was $1 million, leaving net assets at $19.4 million. The 2009 Sherwood budget and unaudited financial statements as of May 31, 2009 show balances of $686,173 in cash (unrestricted) and $9.1 million in certificates of deposit (restricted), with bonds payable of $1.1 million.

The deterioration of reserves resulted from operating expenses significantly exceeding operating revenues. In 2007 operating revenues were $791,118 with operating expenses of $1,401,672; depreciation totaled $547,147. The operating expenses exceeded operating revenues by 77%. For 2009 Sherwood expected operating revenue to rise to $892,000, with operating expenses of $1.57 million (not including depreciation), for an estimated operating loss of $682,486. The projected 2009 operating expenses exceeded projected revenues by 77%.
In December 2009, the City of Sherwood increased its charges per 100 cubic foot (cf) of metered water consumption from $1.69 to $3.00, and from a minimum charge of $6.76 for 400 cf to $12.00, effective January 1, 2010. This 77.5% increase in charges proved sufficient to cover the operating shortfalls that occurred in prior years. In 2012 operating revenues were $1,386,931 with operating expenses of $1,137,060.

Maintenance and repairs are an increasingly large portion of the operating expenses. According to the 2007 audited financial reports, repairs and

maintenance totaled $76,846 in that year. In 2008, repairs and maintenance totaled $131,471, and the 2009 budget projected repairs and maintenance of $220,000. While repairs and maintenance totaled $59,937 for 2012, Sherwood has also begun Phase 3 of sewer and manhole rehabilitation, at an estimated cost of $826,000. The funds from the expired sales tax will be used to pay for these repairs.

A similar increase in cost is occurring in sewer improvements. Improvements to pump-station and treatment plants totaled $19,845 in 2007, rising to a budgeted $180,000 in 2009. In 2012, improvement expenses totaled $104,639. Sherwood is currently accepting bids for improvements to the North and South Plants. The improvements are expected to cost approximately $4 million total. The funds from the expired sales tax will be used to pay for the improvements. Most of the expense of the upgrade is to the equalization basins, consistent with the 2009 Master Plan that recommended the plants be converted to equalization basins with treatment completed at North Little Rock's Five Mile Creek plant.

North Little Rock Finances

The North Little Rock Waste Water Utility's audited 2008 year-end financial statements report total assets of $66.6 million, including $8.2 million in unrestricted cash and CD's and $56.2 million in capital assets. Total liabilities of $17.0 million, including notes payable of $13.9 million, leave net assets of $49.6 million.

North Little Rock accumulated excess revenues during 2008. Operating revenues totaled $9.9 million with operating expenses of $9.5 million. The North Little Rock 2009 budget forecasted similar numbers for 2009: $10.6 million in operating revenues and $9.7 million in operating expenses.

During 2009 North Little Rock planned to complete $10.5 million on 12 capital projects, with $4.5 million spent on the White Oak Plant modification. Between 2009 and 2012 North Little Rock planned another $11.1 million on projects, mostly for Faulkner Lake. In 2012 North Little Rock approved a $21 million capital improvement plan, financed by a bond issue procured through the Arkansas Natural Resources Commission. The approved projects include pump stations plus improvements and an expansion at Five Mile Creek. With the expansion, Five Mile Creek would have the capacity to handle all Sherwood residents.

Rates

Sherwood's rates are set forth by Ordinance No. 1850, effective January 1, 2010. All users of the systems are charged a minimum of $12.00 for the first 400 cf and $3.00 for each additional 100 cf of metered water consumption. The ordinance does not specify a schedule for future rate increases.

North Little Rock's rates are set by Ordinance No. 0-12-22, which establishes a schedule of annual rate increases through January 2014. Effective January 1, 2013, the based rate per 100 cf is $3.32, increasing to $3.64 per 100 cf in January 2014. The ordinance also defines the amount of the rates that are devoted to payment of the debt incurred from the capital expansions.

Industrial customers are defined as any non-residential customer normally discharging quantities of 25,000 gallons per day or greater, or whose wastewater contains certain pollutants. While the industrial rates are the same as the residential rates for both customers, both utilities levy additional charges on industrial customers for wastewater exceeding specific concentrations of certain contaminants. For each contaminant, North Little Rock's penalties for wastewater contamination are substantially higher than Sherwood's (See Table 5).

Wastewater Contaminant	**North Little Rock (effective 01/01/2014)**	**Sherwood**
Biochemical Oxygen Demand (BOD) in excess of 250 mg/L	$1.85 per pound	$0.86 per pound
Total Suspended Solids (TSS) in excess of 250mg/L	$0.26 per pound	$0.12 per pound
pH, for all discharges for which the pH is greater than 11 or less than 5	$2.65 per 100cf	$1.23 per 100cf
Fats, Oils and Greases (FOG) for discharges exceeding 100mg/L	$0.68 per pound	$0.31 per pound
Other Limited Parameters	$0.26	$0.12 per 100cf
Petroleum-contaminated waters	$0.52 for the first 5000 gallons; $0.12 for the next 5001-25000; $0.012 for the next 25,001 or above gallons	$0.25 for the first 5000 gallons; $0.06 for the next 5001-25000; $0.006 for the next 25,001 or above gallons

Table 5: Penalties for Exceeding Allowed Levels of Contaminants

Salaries and Benefits

As of 2009, North Little Rock Wastewater Utility employed 81 personnel, while the Sherwood utility employed just 7 workers (the manager, five Operators, and a Maintenance and Repair Technician). Given the difference in size, the utilities use very different organizational structures, which make a direct comparison of labor costs difficult. For example, North Little Rock's greater size requires additional staff, particularly in administration, in the engineering department, and in laboratory testing. However, some simple comparisons are useful. For 2009, the average Sherwood salary was $33,453 and the average North Little Rock salary was $37,005. Focusing on the Treatment and Maintenance workers, the Sherwood salary averaged $29,666 and the North Little Rock salary averaged $31,496. North Little Rock Plant Operators averaged salaries of $30,500, while Sherwood Plant Operators averaged $30,729. This data suggests that the utilities offer similar salaries for jobs with similar duties.

The benefits packages are broadly similar. North Little Rock employees may participate in a defined benefit pension plan after one year of service and reaching 25 years of age. Only the utility contributes to the plan. Employees have the option of contributed to a 457 (Nationwide) plan. Sherwood employees also participate in a defined benefit plan (the Municipal Employees Retirement Plan). The Sherwood plan vests after 10 credited years of service (working at least 1,000 hours), and requires no contributions from employees.

Both utilities offer medical insurance, with coverage including dental and vision care. Both utilities pay the employee's costs of coverage, and both utilities share the cost of family coverage. Both utilities offer medical insurance continuation benefits for employees meeting retirement eligibility requirements. Both utilities' plans include life and accidental death and dismemberment coverage.

North Little Rock employees can go to the Argenta Healthcare Services Clinic free of charge for routine office visits and yearly physical exams, vaccines and lab tests.

Sherwood offers an Educational Assistance Program. The City will pay undergraduate or graduate tuition, fees, and textbooks for up to 15 semester hours at an accredited State school.

Customers

As of 2009, Sherwood served approximately 4,900 customers, 94% of them residential. North Little Rock served approximately 31,000 customers, 90% residential, with 6,644 of the customers residing outside North Little Rock. The 2009 Sherwood Master Plan developed by Crist Engineers estimated the cost of treatment for Sherwood Plants at $205.36 per customer versus a cost of treatment of $146.31 per customer for the Five Mile Creek plant.

VI. Regionalism: Consolidation and Cooperation

The starting question asked by the mayors in this study was whether the two utilities should consider unification or cooperation. Consolidation (the term typically used rather than unification) and cooperation are two distinct approaches to increased regionalism.

In a previous project, UALR was asked to study the feasibility of a regional approach to water, and as a result, water services in central Arkansas were unified under a single entity, Central Arkansas Water (CAW). The UALR report, "Water for Our Future: Overcoming Regional Paralysis," recommended that the Little Rock and North Little Rock water utilities be merged, in part because of an ongoing rate dispute. By all accounts, this merger has been successful. Currently, CAW serves a population of about 400,000 in the three counties of Pulaski, Saline, and Grant. Included in that service area are the cities of Little Rock, North Little Rock, Sherwood, and Alexander. Additionally, CAW supplies all of the water to Bryant and Shannon Hills, and supplements water to several communities including Jacksonville and the Jacksonville Air Force Base.

Regional approaches, however, are not always warranted. In 2005, UALR issued another report, this time about the feasibility of unifying the Little Rock and North Little Rock Wastewater utilities. The conclusion of that study, "One River—Two Cities," was that there was "no compelling reason to merge the two wastewater utilities into a single entity." Specifically, the study found that there was no physical or legal connection between the two utilities—that in fact the two utilities were almost completely split by the Arkansas River—and thus there was no problem that a merger would solve.

Advocates of regional consolidation argue that consolidation may long-term be the most efficient and least costly way to provide expected services. They argue that citizens desire safe and sanitary water and sewer, a roof over their heads, a job, and a place nearby to buy groceries, get health care, and educate their children; but that what jurisdiction they obtain them is of little or no consequence: most often they don't even think about it.

They further argue that in today's world economy, regions are competitive--not individual cities or counties. From a world economy perspective, Little Rock does not mean the City of Little Rock, but rather the entire Little Rock-North Little Rock-Conway Metropolitan Statistical Area. The geopolitical communities of North Little Rock and Sherwood are but vital parts of this whole. Regional approaches like that of Central Arkansas Water, it is argued, may make the metropolitan Little Rock-North Little Rock-Conway region more competitive in creating and maintaining jobs, while at the same time, enable individual communities in the region to provide better infrastructure services at a more manageable cost to their citizens.

As noted in the previous UALR Task Force study on Little Rock and North Little Rock's wastewater utilities, regionalism may work best in functions such as economic development, especially joint marketing strategies and planning for transportation and land use; but actual consolidation of political units is difficult to achieve. The previous wastewater study found that most experts indicate that actual consolidation of governmental units may lead to increased administrative bureaucracy rather than efficiency. Better, the research suggests, is to seek after cooperative "governance" of a single function instead of merged "government." "Governance," according to the Task Force study, "involves horizontal interlocal cooperation on a voluntary basis through intergovernmental contracts" (page 40). As noted in Mildred Warner's "Inter-municipal Cooperation in the U.S.: A Regional Governance Solution?" adopting interlocal cooperative agreements on specific functions allows communities to achieve economies of scale while still retaining community identity and voice.[23]

On the more specific question of wastewater consolidation, there is little research and few examples nation-wide. We did find a study undertaken in Dearborn County, Indiana, which originally considered consolidating all wastewater systems in the county. They found, however, that "the operational realities of such a plan would be impractical and the capital costs would be beyond reach."[24]

This may be because—at least with regards to the *collection system*—wastewater is very much a local matter. Sewers are in one's own street. When they overflow, one wants to know who to call and who's accountable.

On the other hand, from an environmental perspective, the *treatment* of wastewater may be more of a regional matter since the output generally flows to one location. In the case of North Little Rock and Sherwood, wastewater output all ends up in the Arkansas River. From the perspective of water quality, consolidation of the treatment plants may make it easier to monitor the activity that is affecting a significant *regional* resource. A 2011 study supports this argument. Researchers

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[23] *Restructuring Local Government,* personal website, Cornell University, accessed July 5, 2013 http://ecommons2.library.cornell.edu/web_archive/government.cce.cornell.edu/doc/pdf/UPER6artWARNER.pdf

[24] *Study and Recommendation of Consolidating Wastewater Systems in Dearborn County Regional Sewer District,* Woolpert, Inc., January 25, 2007, page 3, accessed July 5, 2013 http://www.dearborncounty.org/ClientFiles/DBC/file/health_woolpert_report_sewer_district.pdf

found that when treatment was centralized into larger and fewer plants, the "[l]arger facilities tended to operate at flows closer to their design capacity while maintaining treatment suggesting greater efficiency."[25] In other words, consolidating treatment would be better for the environment.

It also may be better financially. According to a study from 2003, "Economies of Scale in Wastewater Treatment and Planning for Urban Growth," there may be significant financial savings in consolidation of treatment plants once urban development has occurred and smaller treatment plants have met capacity.[26]

In short, from an engineering standpoint, from an environmental standpoint, and from a financial standpoint, it makes sense to consolidate Sherwood and NLR wastewater *treatment.*

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[25] Scott R. Weirich, JoAnn Silverstein, and Balaji Rajagopalan, "Effect of Average Flow and Capacity Utilization on Effluent Water Quality from US Municipal Wastewater Treatment Facilities," *Water Research* 45.14 (August 2011): 4279-4286. Academic Search Complete/ScienceDirect 62268931

[26] Lewis D. Hopkins, Gerritt J. Knaap, and Xiaohuan Xu, "Economies of Scale in Wastewater Treatment and Planning for Urban Growth," Abstract, *Environment and Planning B: Planning and Design* 31.6 (November 2004): 879-893. EBSCO.

VII. Analysis

The Sherwood and North Little Rock wastewater utilities are excellent assets to their communities, striving to meet both the needs of their customers and the environmental regulations overseen by ADEQ. The current system, however, has two significant problems:

1. *A Tangled Collection System within the City of Sherwood*

Residents of Sherwood receive wastewater services under three different scenarios: their sewage may be collected through Sherwood WWU pipes but treated at a North Little Rock plant; their sewage may be both collected *and* treated by Sherwood WWU; and their sewage may be both collected and treated by North Little Rock WWU.

While the Sherwood and North Little Rock wastewater utilities currently have a good working relationship with no ongoing disputes, this is a testament to the efforts of the leaders of the two utilities and requires ongoing vigilance and communication by both utilities. It's not as if there is a clear geographical division between the areas served by the two utilities. Literally, sewage may pass from a Sherwood customer through NLR lines and then through Sherwood lines before connecting back into NLR lines before being treated at North Little Rock's Five Mile Creek plant. The map, in other words, is a tangle. Every engineering study concludes this is a problem. Systemically, it is impossible to separate the collection systems to determine responsibility of many different overflows or blockages.

This problem is not just a problem for engineers. From the perspective of Sherwood citizens, this tangle poses complications. While citizens may not care who is in charge as long as their sewage system is working well, they definitely care when their sewage line backs up or they see untreated sewage flowing into a drainage ditch in their neighborhood after a rain. Their natural inclination will be to contact Sherwood City Hall, but with half of Sherwood's collection by North Little Rock, chances are they will be sent to North Little Rock instead. While eventually the correct office may be contacted and the problem solved, in the meantime there is at best a public relations problem and at worst a delayed correction of a sewer problem. For example, last year there was a sewer problem at the Royal Oaks trailer park in Sherwood that hit the evening news:

> It is a sewage problem that doesn't seem to be getting any better says Susie Fletcher.
>
> "It's beyond me why nothing is getting done here," says Fletcher.
>
> She lives in the Royal Oaks Community and says sewage has been building in the area for several months. Now she wants action.

Fletcher has called agency-after-agency to get help. But nothing has worked.

So Fox 16 News stepped in. We first called North Little Rock Waste Water managers since they provide services to the complex. They told us the issue is a property management matter.

But when we called the manager's front office, a spokesperson told us the problem is a Sherwood City issue.

Sherwood managers said they hadn't heard about the problem until we called, and promised to send someone out Monday to evaluate the issue.

"We'd move but we can't afford to. It's gotten to the point where we really don't want to live here. This is a great trailer park but the sewage problem is out of control," said Fletcher."[27]

One significant way that citizens hold their governments accountable is through the power of the vote. One-half of Sherwood citizens have their wastewater collected by the North Little Rock utility, and they pay .32 more per 100 cubic foot than their Sherwood neighbors whose collection is by the Sherwood utility. What those Sherwood utility customers may not know is that one-half of them have their waste treated by the North Little Rock utility, and Sherwood pays to North Little Rock a pro-rata share of the cost of treatment. What this means is that most Sherwood residents have no political recourse with regards to the cost of their sewer system. The North Little Rock government, its commissions, and utilities are not accountable through elections to their Sherwood clients.

2. *Costly Treatment and Duplication of Services*

Three-fourths of Sherwood residents have their sewage treated in North Little Rock at Five Mile Creek Treatment Plant, while one-fourth of Sherwood residents have their sewage treated in Sherwood at North and South treatment plants. The North and South plants are small, older facilities that will require significant resources to meet ADEQ standards. Moreover, because of their location, they rely more on pumping rather than gravity lines—adding to the expense of treatment. Under the current approach, it costs the Sherwood utility $205.36 per customer annually to treat wastewater in their own plants, while it costs only $146.31 per customer for them to have NLR treat their wastewater.

North Little Rock's Five Mile Creek Treatment Plant is geographically close to Sherwood and located within the gravitational basin of Five Mile Creek — including the one quarter of Sherwood residents whose wastewater is not being treated there already. Current plans are to expand Five Mile Creek to a 7.4 MGD capacity, which could accommodate most of Sherwood and its projected growth.

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[27] Sherwood Community Concerned about Sewage Problem." *Fox16.com*. 3 February 2012. Accessed 10 July 2013. http://www.fox16.com/news/local/story/Sherwood-community-concerned-about-sewage-problem/gGauylQhm0WlNTj7gbn0IA.cspx

And, as noted already treatment at the North and South plants costs approximately 40% more than at Five Mile Creek. Finally, from an environmental perspective, having three different plants expelling effluent into the Arkansas River puts that much more burden on the river and the agency charged with maintaining this vital resource.

Two conclusions are inescapable: It is impractical for the collection system within the city boundaries of Sherwood to be administered by two different entities.

It is impractical for the city of Sherwood to invest in upgrading treatment facilities when there is a treatment facility already available.

The citizens of Sherwood are not being served as well as they should.

VIII. Recommendations

The task force recommends two alternatives.

> Alternative 1: Unify the North Little Rock and Sherwood wastewater utilities into a single, consolidated entity that operates north of the Arkansas River and that is not attached to either city.
>
> Alternative 2: Maintain two separate utilities but execute an inter-local agreement between Sherwood and North Little Rock in which Sherwood wastewater *collection* is by Sherwood Wastewater Utility; and Sherwood wastewater *treatment* is by North Little Rock Wastewater Utility at North Little Rock's Five Mile Creek Treatment Plant.

Alternative 1: Unify the North Little Rock and Sherwood wastewater utilities into a single, consolidated entity that operates north of the Arkansas River and that is not attached to either city.

There is legal authority to permit such unification. In 2009, the Arkansas legislature passed the Consolidated Wastewater Systems Act, ACA 25.20.501 et seq., which authorizes interlocal agreements for any kind of cooperative or consolidated wastewater system.

A consolidated utility is probably long-term the most cost-efficient approach, requiring the least duplication of services and the most streamlined administrative structure. It would lead to the most transparent approach for residents: there would be one entity to contact for all problems, one entity to hold accountable. This is the model adopted by Central Arkansas Water. As with CAW, unification might lead eventually to a regional approach to wastewater services, at least north of the river.

There would need to be a new commission established with representation from both cities, and there would need to be an implementation plan with leadership provided by a neutral third party.

There are challenges, however:

First, combining the administrative structure in Sherwood with that of North Little Rock would be difficult because in the current Sherwood administration, the chief officer of the Sherwood Wastewater Utility is also the chief engineer of the city of Sherwood, and her responsibilities extend beyond wastewater.

Second, because of the significant difference in size between the two utilities, it would be difficult to avoid the *perception* of a NLR takeover rather than an equal partnership between two entities in a unification.

Third, the leadership in Sherwood have for a long time held that the city should have its own wastewater utility, in part because they see the utility as a tool for encouraging business to locate in Sherwood. The sales tax fund of $9 million established by Sherwood Ordinance 1470 in 2000 (and sunsetted in 2005) was specifically intended for a Sherwood wastewater system, and there would undoubtedly be arguments over whether it could be used in a unified utility.

Alternative 2: Maintain two separate utilities but execute an inter-local agreement between Sherwood and North Little Rock in which wastewater collection in Sherwood is by Sherwood Wastewater Utility; and wastewater treatment in Sherwood is by North Little Rock Wastewater Utility at North Little Rock's Five Mile Creek Treatment Plant.

The second alternative, while less wide-ranging, may have greater potential for Sherwood support. Under this alternative Sherwood and North Little Rock utilities could enter into an interlocal agreement where all the sewer lines in Sherwood currently owned by North Little Rock would be transferred to Sherwood, while Sherwood would pay North Little Rock for all its treatment. Customer billing and contact would be through Sherwood, while Sherwood would pay North Little Rock for all treatment. Both major problems would still be solved: a single entity would be responsible for collection within Sherwood; and a single entity would be responsible for treatment. The two Sherwood plants would be either de-commissioned or changed into equalization basins—which is exactly what the Crist Master Plan recommended in its August 2009 report.

This approach would achieve some of the economies of scale possible through total consolidation, would create a unified billing approach for all Sherwood customers, and would increase environmental management.

Under this plan, there would need to be a valuation of the lines in Sherwood currently owned and maintained by North Little Rock, and an appropriate exchange be determined. Originally, many of these lines were the property of Sherwood sewer districts, and they were simply transferred to North Little Rock. Additionally, there would need to be a determination of where collection ends and treatment begins—that is where control of the system would pass from Sherwood to North Little Rock. One possibility is to base the division purely on geography, assigning Sherwood responsibility for all pipes within Sherwood city limits, including interceptors and other larger pipes as well as pumping stations and equalization basins like the North Plant. Another possibility is to base the division on line function, assigning North Little Rock responsibility for the larger devices conveying sewage into Five Mile Creek. One problem with this

alternative is that it would still lead to situations where Sherwood sewers would lead into North Little Rock sewers, complicating the determination of fault during sanitary sewer overflows (SSOs).

A challenge in implementing Alternative 2 would be drafting an agreement regarding the cost of Sherwood wastewater treatment in North Little Rock. Currently, treatment costs are determined by the 1990 court order. The formula could continue, or the two cities could approach the courts to request a modification or dismissal, using the 2009 Wastewater Consolidation Systems Act to create a new interlocal agreement.[28]

The benefit of Alternative 2 is that it requires much less administrative change. More significantly, it would allow Sherwood to retain some civic identity in the services provided its residents.

The Task Force believes it should be up to Sherwood and North Little Rock to determine which of these two alternatives to adopt. What is clear to the Task Force is that *one* of these options must be chosen. Otherwise, the utilities are not acting in their customers' and citizens' best interests.

[28] Regardless of the alternative selected, the parties would need to request a modification or dissolution of the 1990 Court Order.