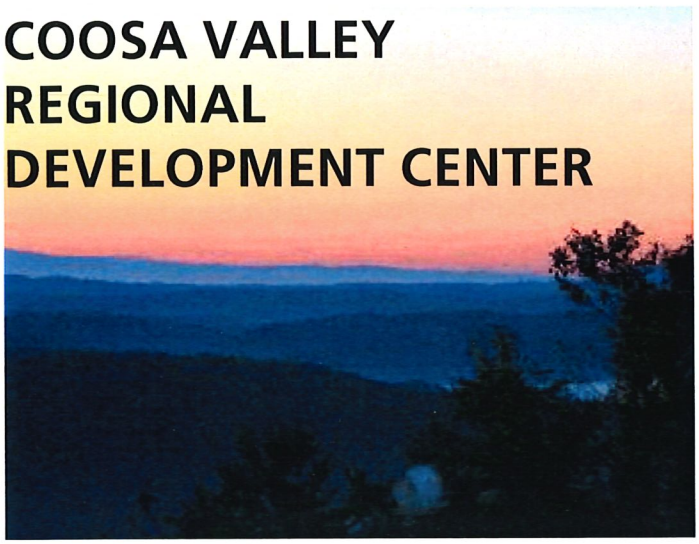
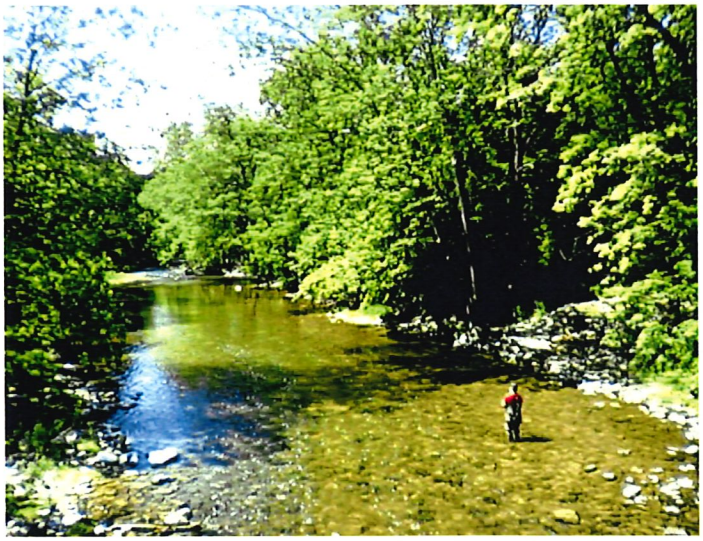
COOSA VALLEY REGIONAL DEVELOPMENT CENTER





NORTHWEST GEORGIA REGIONAL WASTEWATER TREATMENT STUDY

A REGIONAL APPROACH TO WASTEWATER FACILITIES PLANNING ISSUES FOR GEORGIA COMMUNITIES ADJACENT TO CHATTANOOGA, TN

ARCADIS

Infrastructure, buildings, environment, communications

ARCADIS

Northwest Georgia Regional Wastewater Treatment Study

A Regional Approach to Wastewater Facilities Planning Issues for Georgia Communities Adjacent to Chattanooga, Tennessee

This document was accomplished by staff of the recipient through Economic Development Administration, Project 04-86-05130. The statements, findings and conclusions, recommendations, and other data in this report are solely those of the recipient and do not necessarily reflect the views of the Economic Development Administration.

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Table of Contents

Table of Contents

Exhibits

Appendices

Introduction

It has been almost three decades since the original 201 Wastewater Facilities Plan was prepared, published, and issued for the Chattanooga, Tennessee-Georgia planning area.[1] Like numerous other such plans, the 201 study was funded under provisions of the Federal Water Pollution Control Act as amended in 1972 and thereafter. The Act set a goal of pollution-free United States waters by the year 1985, a mandate that remains generally unfulfilled despite decades of substantial investment in improved sewage collection and transmission systems and wastewater treatment facilities by federal, state, and local agencies throughout the country. This national paradox is also true in the Chattanooga, Tennessee-Georgia planning area.

The City of Chattanooga and most other Hamilton County, Tennessee, municipalities have extended sanitary sewer service to all parts of their jurisdictions, and the Hamilton County Water and Wastewater Treatment Authority continues a program to provide service to developed and developing non-municipal areas and many smaller municipalities. However, many parts of the North Georgia portion of the original 201 study area remain without significant sanitary sewer service or adequate wastewater treatment facilities. Since publication of the Volume I Base Data report in 1975,[2] rapid population growth has continued unabated in the North Georgia counties of Catoosa, Walker, and Dade. The provision of adequate sanitary sewer service has not kept pace with this ever-growing need.

Purpose

In addition to establishing the current status of population and wastewater treatment issues, the original 201 study projected future population, development, and wastewater collection, transmission, and treatment demands in a series of 10-year increments through 2020 and provided reasonable 100 percent built-out development population figures. The purpose of this study is to quantify the current situation relative to the wastewater needs of the Georgia portion of the original 201 planning study area, adjust (enlarge) the area as needed, and provide reasonable projections of anticipated growth in demand over the next 20 years in 5-year increments through 2025. This

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[1] Hensley-Schmidt, Inc., *Chattanooga, Tennessee-Georgia 201 Wastewater Facilities Plan,* Environmental Protection Agency Project C470387, May 1975. Summary of the data from the introduction of the original 201 study (pp. 1-13) along with added comments, where appropriate, reflect North Georgia community issues.

[2] *Chattanooga, Tennessee-Georgia 201 Wastewater Facilities Plan*, "Base Data Report," Volume I, (1975).

report then proposes alternative solutions to meet demand, selects recommended solutions, and presents implementation strategies. In this way, the study serves as an update to the Georgia portion of the original study. The larger context for the current report and the limits of the current study area are shown in Exhibit 1.

Planning Area

The planning area for the 201 study initially included all areas that drain to the Tennessee River at Chattanooga from most of Hamilton County, Tennessee; portions of Dade, Catoosa, and Walker counties, Georgia, excluding the upper reaches of the Tiger Creek and East Chickamauga Creek drainage subbasins in Whitfield County (72.83 square miles included in the current study area); and the upper reaches of the Lookout Creek basin in DeKalb County, Alabama (approximately 50 square miles also not included in the current study area).

The original 201 study planning area was approximately 960 square miles (614,000 acres), including the approximately 536 square miles in North Georgia addressed in this report.[3] A summary of selected area and population data from the original 201 study as it relates to the study area for the subject report can be found in Appendix A. Generally, the Georgia drainage subbasins defined in the original study are used as the planning area for this report. The exceptions are as follows:

- The Little Chickamauga Creek, Peavine Creek, and West Chickamauga Creek drainage subbasins are separated into the portions in Catoosa County and the portions in Walker County to enable better facilitation of jurisdictional issues.
- For purposes of this study, the Dry Creek drainage subbasin is isolated from the Chattanooga Creek drainage subbasin since these two Walker County subbasins do not join until after they have crossed the Tennessee-Georgia state line.
- The Chattanooga Creek drainage subbasin is separated into the portions in Walker County and the portions in Dade County due to jurisdictional issues.
- Several areas of Walker and Whitfield counties that are technically within the drainage subbasins of the original 201 study but were not included in that report are shown as a part of the study area for this report. Portions of Dade County that are outside the drainage basin are included for informational purposes only.

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[3] Hensley-Schmidt, Inc., p.4.

MOCCASIN BEND WASTEWATER TREATMENT PLANT

REGIONAL INTERCEPTOR SYSTEM

STUDY AREA

STUDY AREA
EXHIBIT 1

NORTHWEST GEORGIA REGIONAL WASTEWATER TREATMENT STUDY

COOSA VALLEY REGIONAL DEVELOPMENT CENTER

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SCALE IN MILES

The drainage subbasins within the study area are delineated in dark-green, dashed outlines and labeled in dark-green text on Exhibit 2. Subbasin and census tract and sub-tract areas as well as 201-study reported year 1970 population and calculated density, projected year 2000 population and actual year 2000 population and calculated density (based on U.S. Census Bureau data) for each subbasin can be found in Exhibit 3.

Study Methodology

This study was conducted by use of a phased approach whereby information from the original 201 study was reviewed and analyzed as the foundation for an update of the Georgia portion of the study and gathering and developing additional data to provide a feasibly accurate picture of previous conditions and predictions, current conditions and credible predictions for meeting future needs.

The first phase of the study is a baseline of current conditions established to quantify the level of existing need and to compare this with projections made in the 201 study.

It is generally agreed that study area development patterns, past and present, are overwhelmingly residential and appear likely to continue that trend. Current and projected population figures at a drainage subbasin level are the best indicators of wastewater treatment capacity demand. Consequently, projections of wastewater flows in this study are based solely on existing and projected population figures.

Using the modified 201 drainage subbasins described previously as a framework, the most current population figures were assigned to the subbasins. This was done using 1990 and 2000 population reports from the U.S. Census Bureau (USCB) at a census tract level and then further subdividing the census tracts to correlate more closely to the drainage subbasins. In this way, the current subbasin populations, trends, and projections can be compared with the population estimates and projections in the original 201 study, thus establishing a basis for updated population projections at the drainage subbasin level.[4] Where census tracts were subdivided by drainage subbasin, an appropriate suffix was added, designating a north (N), east (E), south (S), or west (W) partition. The census tract subdivisions used to apportion the population figures within the drainage subbasins are delineated in thick dark-red, short-dashed lines and labeled in dark red text on Exhibit 2. Area and population figures are shown in tabular form on Exhibit 3.

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[4] U.S. Census Bureau, http://factfinder.census.gov/servlet, March 31, 2003.

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Discrete Drainage Sub-basins and Parent Census Tract Subdivisons	% of Parent Area	Parent Tract Area* (sq. mi.)	Sub-tract Area (sq. mi.)	201 Study-Reported 1970 Pop.**	Calculated Basin 1970 Pop.Density	201 Study-Projected 2000 Pop.**	% of Parent 2000 Pop.*	Total Parent Tract 2000 Pop.*	Sub-tract and Basin 2000 Pop.*	Calculated Basin 2000 Pop. Density*
Hurricane Creek (Catoosa)										
302.00N	25%	19.02	4.76			1,071	25%	8,607	2,152	
			4.76	604	127/sq.mi.	1,071			2,152	453/sq.mi.
Tiger Creek (Catoosa/Whitfield)										
001.02W	40%	27.73	11.09			-	20%	6,314	1,263	
301.00E	50%	56.72	28.36			3,054	50%	6,448	3,224	
			39.45	1,612	41/sq.mi.	3,054			4,487	114/sq.mi.
East Chickamauga Creek (Catoosa/Whitfield)										
005.01N	15%	10.98	1.65			-	5%	2,958	148	
006.00W	75%	8.89	6.67			-	90%	3,950	3,555	
007.00	100%	36.78	36.78			-	100%	3,670	3,670	
301.00S	40%	56.72	22.69			1,273	40%	6,448	2,579	
			67.78	676	10/sq.mi.	1,273			9,952	147/sq.mi.
Little Chickamauga Creek (Catoosa)										
303.00E	70%	37.41	26.19			2,550	60%	11,307	6,784	
			26.19	1,725	66/sq.mi.	2,550			6,784	259/sq.mi.
South Chickamauga Creek (Catoosa)										
302.00E	70%	19.02	13.31			8,145	70%	8,607	6,025	
303.00N	5%	37.41	1.87			-	10%	11,307	1,131	
			15.18	4,799	316/sq.mi.	8,145			7,156	471/sq.mi.
Peavine Creek (Catoosa)										
302.00W	5%	19.02	0.95			-	5%	8,607	430	
303.00W	25%	37.41	9.35			-	30%	11,307	3,392	
304.01E	50%	23.01	11.51			5,091	50%	5,752	2,876	
304.02E	60%	8.34	5.00			-	60%	5,690	3,414	
			26.81	4,420	165/sq.mi.	7,594			10,112	377/sq.mi.
Spring Creek (Catoosa/Walker)										
201.00N	40%	6.93	2.77			10,285	50%	6,652	3,326	
305.00W	60%	3.68	2.21			-	60%	4,118	2,471	
306.00	100%	2.52	2.52			24,179	100%	5,205	5,205	
307.00W	25%	11.52	2.88			-	75%	6,155	4,616	
			10.38	18,769	1,808/sq.mi.	31,964			15,618	1,505/sq.mi.
West Chickamauga Creek (Catoosa)										
304.01W	50%	23.01	11.51			-	50%	5,752	2,876	
304.02W	40%	8.34	3.34			-	40%	5,690	2,276	
305.00E	40%	3.68	1.47			-	40%	4,118	1,647	
307.00E	75%	11.52	8.64			-	25%	6,155	1,539	
			24.95	2,486	100/sq.mi.	6,364			8,338	334/sq.mi.
West Chickamauga Creek, Etc. (Walker)										
203.02E	20%	9.56	1.91			-	20%	5,647	1,129	
205.01	100%	12.22	12.22			-	100%	6,827	6,827	
205.02E	65%	32.99	21.44			-	50%	5,592	2,796	
206.01E	10%	26.57	2.66			-	5%	4,553	228	
206.01N	40%	26.57	10.63			2,503	65%	4,553	2,959	
206.01W	40%	26.57	10.63			-	40%	4,553	1,821	
206.02E	50%	30.41	15.21			-	15%	3,607	541	
208.00	100%	128.62	128.62			-	100%	3,015	3,015	
			203.31	12,110	60/sq.mi.	20,315			19,317	95/sq.mi.
Dry Creek (Walker)										
201.00S	20%	6.93	1.39			-	15%	6,652	998	
201.00W	40%	6.93	2.77			-	35%	6,652	2,328	
202.00	100%	2.15	2.15			-	100%	3,630	3,630	
203.01E	40%	9.43	3.77			-	60%	4,822	2,893	
203.02N	20%	9.56	1.91			-	20%	5,647	1,129	
			7.83	7,435	949/sq.mi.	10,566			10,979	1401/sq.mi.
Chattanooga Creek (Walker)										
203.01W	60%	9.43	5.66			-	40%	4,822	1,929	
203.02W	60%	9.56	5.74			-	60%	5,647	3,388	
204.00N	85%	25.76	21.90			-	95%	2,920	2,774	
205.02W	35%	32.99	11.55			-	50%	5,592	2,796	
			44.84	9,683	216/sq.mi.	13,166			10,887	243/sq.mi.
Lookout Creek (Dade)										
204.00S	15%	25.76	3.86			163	5%	2,920	146	
401.00E	95%	94.34	89.62			-	100%	7,784	7,784	
402.00N	20%	39.55	7.91			438	40%	4,086	1,634	
402.00S	80%	39.55	31.64			-	60%	4,086	2,452	
			133.04	7,211	54/sq.mi.	9,573			12,016	90/sq.mi.
Other Dade Areas										
401.00W	5%	94.34	4.72			-	0%	7,784	0	
403.00E	10%	40.09	4.01			-	10%	3,284	328	
403.00N	50%	40.09	20.05			-	50%	3,284	1,642	
403.00S	40%	40.09	16.04			-	40%	3,284	1,314	
			44.81						3,284	73/sq.mi.
Totals			649.33	71,787	111/sq.mi.	115,635			121,081	186/sq.mi.

* 2000 U.S. Census Bureau

** May 1975 Chattanooga, TN-GA 201 Wastewater Facilities Plan (Volume 1 Base Data)

December 30, 2003

EXHIBIT 3

Study Area Population Status

For planning purposes, projected / design wastewater flow was based on the criteria of 100 gallons per day (gpd) per capita (including an allowance for infiltration/inflow) in residential development areas and 1,000 gpd per acre (also including an allowance for infiltration/inflow) in commercial and industrial development zones. For purposes of establishing peak hydraulic flow, a 2.5 peaking factor was assigned to all base flow numbers generated. The resulting peak hydraulic flow numbers of 250 gpd per capita for residential areas and 2,500 gpd per acre for commercial and industrial areas were then used to calculate aggregate projected wastewater flows and indicate approximate interceptor, pump station, force mains, or gravity sewer pipe sizes requirements where shown in tables within this report. All sizes will be expressed in equivalent gravity interceptor sewer pipe sizes, assuming the minimum slope needed to maintain a velocity of 2 feet per second (fps).

Drainage Subbasin, Area, and Population Information

The first level of data to be addressed is drainage subbasin, area, and population information. Additional detail on these issues can be found in Appendix A.

Population and Development Predictions from 201 Study

Data from the original 201 study was compared with 2000 U.S. Census Bureau population data as a basis for determining the current status of wastewater flows and to make provisions for future demand.

The estimated 1974 population of the 201 study area was 300,000, including 72,000 from the North Georgia area addressed in this report.[5] It was predicted in the original 201 study that over the 25 years leading up to 2000, growth in the Georgia portion of the study area would continue to be primarily residential, following the routes of several major and then-developing transportation corridors, in roughly the same type of development mix observed at that time, primarily low-density residential.[6]

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[5] Hensley-Schmidt, Inc., p. 4.

[6] Hensley, Schmidt, Inc., p. 11.

Historical Development

Land Use	Percentage	Acres
Vacant	57.7	325,145
Residential	25.1	141,629
Open Space	6.4	36,323
Public/etc.	5.5	30,924
Industrial	4.3	24,284
Commercial	1.0	5,466
Total	**100.0**	**563,771**

The 201 study data indicate that in the mid-1970s, the apparent approximate land use mix in the privately developed parts of the study area for this report was as follows:

Residential	82.6%
Industrial	14.1%
Commercial	3.3%

Actual development in the study area for this report has apparently been even more heavily weighted toward low-density residential land uses than had been anticipated 30 years ago, such that the current mix appears to be as follows:

Residential	90.0%
Industrial	5.0%
Commercial	5.0%

Subbasin Delineation and Projected Population

Drainage basin delineation, area (in both square-miles and acres), current and projected population data, and subsequent population densities to be used in wastewater planning are based on delineations and order of the subbasins found in the original 201 study (p.54-82). Population density changes between 1970 and 2000 indicate relative growth patterns. For a more detailed description of the subbasin boundaries, census tract subdivisions, other data criteria, area, population analysis methodologies, and resulting data on which these analyses are based, see Appendix A.

Hurricane Creek Subbasin

The 4.76-square-mile (3,046-acre) Hurricane Creek Subbasin has experienced dramatic growth since the 201 study was published in 1975 and has risen from a population of 604 in 1970 (a density of 127 per square mile) to a year 2000 population of 2,152 (a density of 453 per square mile).

Tiger Creek Subbasin

The 39.45-square-mile (25,248-acre) Tiger Creek Subbasin has experienced dramatic growth since the 201 study was published in 1975 and has risen from a population of 1,612 in 1970 (a density of 41 per square mile) to a year 2000 population of 4,487 (a density of 114 per square mile).

East Chickamauga Creek Subbasin

The 67.78-square-mile (43,379-acre) East Chickamauga Creek Subbasin has been expanded as well as experiencing substantial population growth since the 201 study was published in 1975. It has risen from a population of 676 in 1970 (a density of 10 per square mile) to a year 2000 population of 9,952 (a density of 147 per square mile).

Little Chickamauga Creek (Catoosa County) Subbasin

The 26.19-square-mile (16,762-acre) Catoosa County portion of the Little Chickamauga Creek Subbasin has shown dramatic growth since the 201 study was published in 1975 and has risen from a population of 1,725 in 1970 (a density of 66 per square mile) to a year 2000 population of 6,784 (a density of 259 per square mile).

South Chickamauga Creek (Georgia) Subbasin

The 15.18-square-mile (9,715-acre) Georgia portion of the South Chickamauga Creek Subbasin has seen only moderate growth since the 201 study was published in 1975, rising from a population of 4,799 in 1970 (a density of 316 per square mile) to a year 2000 population of 7,156 (a density of 471 per square mile).

Peavine Creek (Catoosa County) Subbasin

The 26.81-square-mile (17,158-acre) Catoosa County portion of the Peavine Creek Subbasin has shown a substantial growth since the 201 study was published in 1975 and has risen from a population of 4,420 in 1970 (a density of 165 per square mile) to a year 2000 population of 10,112 (a density of 377 per square mile).

Spring Creek (Georgia) Subbasin

The 10.38-square-mile (6,643-acre) Georgia portion of the Spring Creek Subbasin has had a population drop since the 201 study was published in 1975, from a population of 18,769 in 1970 (a density of some 1,808 per square mile) to a year 2000 population of 15,618 (still a density of 1,505 per square mile, the highest in the study area).

West Chickamauga Creek (Catoosa County) Subbasin

The 24.95-square-mile (15,968-acre) Catoosa County portion of the West Chickamauga Creek Subbasin has experienced substantial growth since the 201 study was published in 1975 and has risen from a population of 2,486 in 1970 (a density of 100 per square mile) to a year 2000 population of 8,338 (a density of 334 per square mile).

West Chickamauga Creek (Walker County) Subbasin

The Walker County portions of three distinct subbasins are combined for purposes of this report to form the 203.31-square-mile (130,118-acre) Walker County portion of the West Chickamauga Creek Subbasin. In addition to West Chickamauga Creek portion, the Walker County portions of the Little Chickamauga Creek Subbasin and the Peavine Creek Subbasin are combined to form a mega-subbasin. This aggregate area has only experienced modest growth since the 201 study was published in 1975, increasing from a population of 12,110 in 1970 (a density of only 60 per square mile) to a year 2000 population of 19,317 (a density of 95 per square mile).

Dry Creek Subbasin

The 7.83-square-mile (5,011-acre) Dry Creek Subbasin has experienced only very slow growth since the 201 study was published in 1975, rising from a population of 7,435 in 1970 (a density of 949 per square mile) to a year 2000 population of 10,979 (a density of 1,401 per square mile, still very high for the study area).

Chattanooga Creek Subbasin (Georgia)

The 44.84-square-mile (28,698-acre) Georgia part of the Chattanooga Creek Subbasin (not including the Dry Creek Subbasin) has experienced very slow growth since the 201 study was published in 1975, rising only modestly from a population of 9,683 in 1970 (a density of 216 per square mile) to a year 2000 population of 10,887 (a density of 243 per square mile).

Lookout Creek (Georgia) Subbasin

The 133.04-square-mile (85,186-acre) Georgia portion of the Lookout Creek Subbasin has experienced substantial growth since the 201 study was published in 1975 and has risen from a population of 7,211 in 1970 (a density of only 54 per square mile) to a year 2000 population of 12,016 (a density of 90 per square mile, among the lowest in the study area for this report).

Other Dade County Areas

A 44.81-square-mile (28,678-acre) area of Dade County, primarily on Sand Mountain, which does not flow into the Tennessee River at Chattanooga, is shown for informational purposes only. Since it was not a part of the original 201 study area, no population figures from 1970 were provided. A year 2000 population of 3,284 indicates a density of only 73 per square mile, by far the lowest in the study area for this report.

Observations on Changes in Population Densities within the Study Area

The total year 1970 population for the Georgia portion of the original 201 study area was approximately 71,787. Published in 1975, the 201 study projected a year 2000 population for the study area of 115,635. Information provided by the USCB indicates that the actual year 2000 population is actually 121,081. What is most significant about this figure is that, contrary to the predictions found in the 201 study, some portions of the study area have actually lost population. At the same time, population growth in other areas has dwarfed the projections found in the 201 study. Several factors have been suggested by representatives of participating agencies, published articles, and additional research to explain why these unexpected population changes have occurred:

1. The rapid expansion of public water service throughout rural parts of North Georgia from 1970 to 2000 has enabled much more intensive development in areas farther away from previous population concentrations:

   - Ringgold once was an isolated municipality with its own public water supply and sanitary sewer system, both tied to and limited by the capacities of South Chickamauga Creek, and surrounded by sparsely developed rural and agricultural areas.

   - Fort Oglethorpe was a re-developed U.S. Army cavalry post with public water supplied by Tennessee-American Water Company and a sanitary sewer system discharging into the relatively low-flow Black Branch.

Although bordered on the north by the moderate- to high-density Lakeview and East Ridge communities, Fort Oglethorpe was also surrounded on the south and east by very rural areas, but is now surrounded by increasingly developing residential communities in all nearby subbasins.

- Chickamauga was an industrial isolated municipality with its own spring-fed public water supply and sanitary sewer system on West Chickamauga Creek, also surrounded by rural areas of very low population. Growth has continued in several surrounding directions.

- Rossville was a densely populated Chattanooga-satellite industrial suburb with both public water and sanitary sewer system ties to its northern neighbor. Surrounding areas of Dry Valley and Chattanooga Valley have experienced rapid, recent growth.

- Trenton was an isolated municipality with public water and sanitary sewer systems tied to and limited by Lookout Creek and surrounded by extremely low-density rural territories. Residential growth has occurred throughout all parts of Dade County since then.

2. Development of the interstate highway system in the study area during the 1960s and 1970s, including I-59 and more importantly I-75, has dramatically reduced the commute time from previously remote areas of Catoosa County and Dade County to jobs in Chattanooga.

3. The emergence of the Dalton area as an industrial center from 1960 to 2000 (and recently declared to be a metropolitan area in its own right) has resulted in two major nearby job markets for residents throughout the study area, but particularly in Catoosa County, centrally located along I-75 between Dalton in Whitfield County, Georgia, and Chattanooga in Hamilton County, Tennessee.

4. Periods of perceived instability within the Chattanooga and Hamilton County public educational environments, including desegregation measures, perceived disparities between blighted inner-city conditions and suburban environments, perceived comparative educational underperformance, funding and taxation issues, and systems consolidation, etc., have led to an apparent pattern of both urban and suburban migration by many families with school-age children from Chattanooga and Hamilton County to neighboring communities in Georgia.

5. Perceived and actual opportunities created by the Georgia Lottery, such as the HOPE scholarship program, appear to have lured many families southward.

6. The relatively low density of many Georgia communities in close proximity to higher-density Hamilton County communities has created opportunities to take advantage of abundant, more affordable land for development.

7. While population figures in the most intensely populated parts of the study area increased slowly or decreased from 1970 to 2000, some of the most sparsely populated parts of the study area have experienced a population boom.

    - Despite having the highest year 2000 population density, the Spring Creek Subbasin actually had a lower population in 2000 than in 1970, despite 201 study projections of a substantial increase.

    - Some of the historically most sparsely populated parts of the study area have experienced substantially larger increases in population than was anticipated 30 years ago, e.g., the East Chickamauga Creek and Little Chickamauga Creek subbasins.

    - Minor differences in the boundaries of the Georgia portion of the original 201 study area and those of the study area for this report may account for a small part of the population increases in some of the more remote areas, e.g., the East Chickamauga Creek and Tiger Creek subbasins and "other Dade County areas."

8. Limited planning and zoning efforts by many Georgia agencies have allowed lower-cost housing to flourish, often in areas without adequate infrastructure, attracting first-time homebuyers (and increasing demands of local agencies).

Non-Industrial Systems within Study Area

In addition to the population figures used to address residential development areas, the list of specific discharge points provided in the original 201 study was also reviewed. A number of changes in status have occurred over the intervening years. The current status of this 201 study list as well as a list of discharges permitted by the Environmental Protection Division of the Georgia Department of Natural Resources (Georgia EPD), other points of discharge and other particular wastewater issues of concern are all addressed in greater detail in Appendix B.

201 Study

The non-industrial-source wastewater treatment systems identified in the 201 study that remain of specific concern are listed in Exhibit 4 with an update on their current status. Of those on the list in 1975, over half have been adequately resolved.

EXHIBIT 4
Remaining Non-Industrial Wastewater Treatment Systems of Concern
Status Update

Non-Industrial Source Wastewater Treatment Systems	Still of Concern	Current Status of Service
Fast Petroleum at I-24 Exit 169 (Dade County)	✓	Currently treating wastewater on-site; however, construction to connect to ISS/MBWWTP is now under way.
Trenton Waste Water Treatment Plant (Dade County)	✓	Operating at 1.0 MGD permitted capacity with discharge of treated effluent to Lookout Creek.
Wildwood Lifestyle Center and Hospital at I-24 Exit 169 (Dade County)	✓	Currently treating wastewater on-site; however, construction to connect to ISS/MBWWTP is now under way.
Morris Estates Residential Subdivision (Catoosa County)	✓	Treating wastewater in oxidation pond with effluent discharged into South Chickamauga Creek; however, sanitary sewer is available to connect to ISS/MBWWTP.
Ringgold Waste Water Treatment Plant (Catoosa County)	✓	Operating at permitted capacity of .75 MGD with discharge of treated effluent into South Chickamauga Creek; plans in progress to abandon facility and transport wastewater directly to ISS/MBWWTP.
Sherwood Forest Mobile Home Park (Catoosa County)	✓	Sanitary sewer connected to on-site oxidation pond that appears to be operating poorly; but sanitary sewer is available nearby to enable connection to ISS/MBWWTP.

EXHIBIT 4 Remaining Non-Industrial Wastewater Treatment Systems of Concern Status Update		
Non-Industrial Source Wastewater Treatment Systems	**Still of Concern**	**Current Status of Service**
Golden Gallon at I-75 Exit 345 (Catoosa County)	✓	On-site wastewater treatment system with effluent discharged into tributary of East Chickamauga Creek.
Cochran's Truck Stop at I-75 Exit 345 (Catoosa County)	✓	On-site wastewater treatment system with effluent discharged into nearby tributary of East Chickamauga Creek.
Knights Inn (Catoosa County)	✓	On-site wastewater treatment with discharge of treated effluent pumped into tributary of Peavine Creek.
Archer Division, E.T. Barwick Industries, Inc. (Walker County)	✓	On-site wastewater treatment with discharge of treated effluent into West Chickamauga Creek; plans to connect to Chickamauga WWTP.
Chickamauga Waste Water Treatment Plant (Walker County)	✓	Although previously permitted for 5.0 MGD, plant operates at 3.5 MGD with discharge of treated effluent into West Chickamauga Creek.
Mitchell Acres Residential Subdivision (Catoosa County)	✓	On-site oxidation pond with treated effluent discharged into West Chickamauga Creek; plans to connect to ISS/MBWWTP.
Dow-Reichold Chemical, Inc. (Walker County)	✓	On-site wastewater treatment with discharge of treated effluent into West Chickamauga Creek; plans to connect to Chickamauga WWTP.
Source: Hensley-Schmidt, 1975, pp. 174-203		

Permitted Discharges in Study Area

A list of discharge points currently permitted by the Georgia EPD is included in Appendix B.

Additional Discharge Points of Concern

In addition to the discharge points permitted by Georgia EPD, a list of additional discharge points of concern raised by representatives of participating agencies is also listed in Appendix B.

Environmental Issues

An assessment of general environmental issues that affect development in general and the accommodation of sanitary sewage service in particular is also addressed in Appendix B.

Existing Facilities and Areas Served

Public sanitary sewer systems are currently found in only very limited portions of the study area, as shown on Exhibit 5. Also shown on this exhibit are the sanitary sewer service delivery areas assigned to the respective local public agencies.

EXHIBIT 5

Public Agencies Providing Sanitary Sewer Services and Subbasins Served

Public Agency	Subbasin	Comments
Dalton Utilities (Whitfield County)	East Chickamauga Creek (Whitfield County)	A large area with a relatively sparse population made it easy for this area to out-pace the previously projected 2000 population by almost tenfold. Shortened commute times to Chattanooga afforded by the proximity of I-75 exits 341 and 345 and growth in Dalton-area jobs have added to the appeal of this area. There are no sanitary sewer systems in this area of Whitfield County and no near-term plans for future construction.
	Conasauga River	The Conasauga River subbasin, where Dalton Utilities provides an extensive sanitary sewer system, is outside of the study area.
City of Ringgold (Catoosa County)	Hurricane Creek (Catoosa County)	Like the East Brainerd and Apison communities in Hamilton County, the Hurricane Creek Subbasin in Catoosa County is growing rapidly. Windstone and The Meadows subdivisions, equipped with sanitary sewer systems, are among areas that have contributed to this population growth. Much of the growth has been a result of creative approaches to providing sanitary sewer service that have made higher population densities possible. The relatively sparse population of 1970 made it easier to almost double the population that was previously projected for 2000. Other than two subdivision systems, no other sanitary sewer service is currently provided in the Georgia portion of this subbasin.

EXHIBIT 5

Public Agencies Providing Sanitary Sewer Services and Subbasins Served

Public Agency	Subbasin	Comments
	Tiger Creek	A large area with a relatively sparse population made it easy for this area to almost double the previously projected 2000 population. The proximity of I-75 Exit 345 has shortened commute times to Chattanooga and the growth in available Dalton-area jobs have added to the appeal of this area.
	East Chickamauga Creek (Catoosa County)	A large area with a relatively sparse population made it easy for this area to out-pace the previously projected 2000 population by almost ten-fold. Shortened commute times to Chattanooga afforded by the proximity of I-75 exits 341 and 345 and growth in jobs in the Dalton-area have added to the appeal of this area.
	Little Chickamauga Creek (Catoosa County)	A large area with a relatively sparse population made it easy for this area to out-pace the previously projected 2000 population by almost four-fold. The proximity of I-75 Exit 348 has added to the appeal of this area.
	South Chickamauga Creek	Although relatively populated in 1970, this area has had very slow residential growth. Substantial industrial growth in this area has generated increased wastewater flows without significant population growth. Sanitary sewer service has long been provided in the City of Ringgold, and in recent years, service has been expanded to limited outside areas, as well.
	Peavine Creek (Catoosa County)	This area has experienced a 50-percent increase in the 2000 population projections from 1975. The proximity of I-75 Exit 348 has added to the appeal of this area. The proximity of I-75 Exit 350 to Battlefield Parkway (SR 2) has shortened commute times to Chattanooga and made this area more convenient, adding to its residential appeal. The provision of enhanced sanitary sewer service, beginning in 1995, has facilitated rapid population growth.

EXHIBIT 5

Public Agencies Providing Sanitary Sewer Services and Subbasins Served

Public Agency	Subbasin	Comments
City of Fort Oglethorpe (Catoosa County)	Spring Creek (Catoosa County)	The highest-density population of the entire study area in 1970, through 2000, and with projections into the foreseeable future. Although intensively populated, it appears that the current population may actually be less than it was in 1970. The population of this area is little more than half that predicted in 1975 for the year 2000. .
	West Chickamauga Creek (Catoosa County)	Already populated and stable, this area has had growth since 1970 but at a lesser rate than other subbasins. Growth has been only about 25 percent more than the rate predicted in 1975. The proximity of I-75 Exit 353 has made this area a convenient Chattanooga "bedroom community." Proposed provision of enhanced sanitary sewer service in this subbasin should accelerate population growth. The extreme northeast corner of this subbasin does not appear to have been assigned to any particular agency. Green acres Mobile Home Park, Ray's Trailer Park, and Direct Connection / Kinder's Furniture Mall operate private sanitary sewer systems within this subbasin.
Walker County Water and Sewer Authority	West Chickamauga Creek (Walker County)	Already populated and stable, this portion of this subbasin has had growth, but no more than was predicted in 1975. Population projections made for this subbasin portion were more accurate than any other in the study area. The Walker County Water and Sewer Authority owns, operates, and maintains a wastewater treatment plant in the City of Chickamauga on West Chickamauga Creek that serves the city and nearby Walker County areas in this subbasin.
	Little Chickamauga Creek Subbasin (Walker County)	Population remains very sparse. There are no plans to provide sanitary sewer service in this area.

EXHIBIT 5

Public Agencies Providing Sanitary Sewer Services and Subbasins Served

Public Agency	Subbasin	Comments
	Peavine Creek Subbasin (Walker County)	Population has steadily increased in this area since 1975. Institutional and industrial development has led to a substantial increase in wastewater flows generated from this subbasin. Expansion of the sanitary sewer system has been facilitated by connection with the wastewater treatment plant in Chickamauga.
	Spring Creek (Walker County)	The highest-density population of the entire study area in 1970, through 2000, and with projections into the foreseeable future. Although intensively populated, it appears that the current population may actually be less than it was in 1970. The population is little more than half that predicted in 1975 for the year 2000.
	Dry Creek (non-municipal)	Among the most densely populated areas in 1970, the 2000 population appears to have decreased. In 1975,the Dry Creek-Chattanooga Creek areas were expected to experience a slow and steady decline in population as far out as projected. The population drop in this basin appears to have been even greater than was expected in 1975. Although the 1975 projections anticipated the decline to continue, use of the broadly-applied join-plan formula indicates population growth in the future.
	Chattanooga Creek (non-municipal)	Moderately populated in 1970 (particularly in and around Flintstone), there was a decrease in population between 1970 and 2000. In 1975,the Dry Creek-Chattanooga Creek areas were expected to experience a slow and steady decline in population as far out as could be projected. The population drop in this basin appears to have been even greater than expected in 1975. Although the 1975 projections anticipated this decline to continue, use of the broadly applied joint-plan formula indicates population growth. Sanitary sewer service provided by connection to the ISS since 1975 has recently been expanded further upstream.

EXHIBIT 5

Public Agencies Providing Sanitary Sewer Services and Subbasins Served

Public Agency	Subbasin	Comments
City of Chickamauga	West Chickamauga Creek (Walker County)	The city is situated along West Chickamauga Creek in Walker County. Population trends appear to have followed much of the rest of this subbasin. Sanitary sewer service has long been provided to residential, commercial, and industrial users.
City of Rossville	Dry Creek	Population trends seem to follow much of the rest of the area in the Dry Creek Subbasin. Sanitary sewer service has long been provided to the residential, commercial, and industrial users.
City of Lookout Mountain	Chattanooga Creek	Population trends seem to follow much of the rest of the area in the Chattanooga Creek Subbasin. Although as an established residential community, sanitary sewer service has only recently been provided throughout the city.
Dade County Water and Sewer Authority	Lookout Creek	Relatively unpopulated in 1970, this area still lags the rest of the study area in population density. Growth from 1970 to 2000 was less than 10 percent more than was anticipated. Proximity to Chattanooga via I-59 and I-24 and short commute times from I-59 exits 17, 11, and 4 and I-24 Exit 169 would normally have accelerated the pace of development, but limitations on available public water, sanitary sewer service, and other infrastructure have discouraged growth.
	Other Dade County Subbasins	These areas were not included in the original 201 study, in part, because they flow away from the Tennessee River at Chattanooga and consequently do not affect Chattanooga area water quality. Although substantial growth has occurred since 1970, all of these areas remain very sparsely populated. The likelihood of significant development densities in any of these areas appears to be unlikely in the near future.
City of Trenton		Only a few areas within the city are without sanitary sewer services. Very few areas outside the city have sanitary sewer service.

The parts of the study area currently served by sanitary sewers are shown on Exhibit 6.

MOCCASIN BEND WASTEWATER TREATMENT PLANT

REGIONAL INTERCEPTOR SYSTEM

STUDY AREA

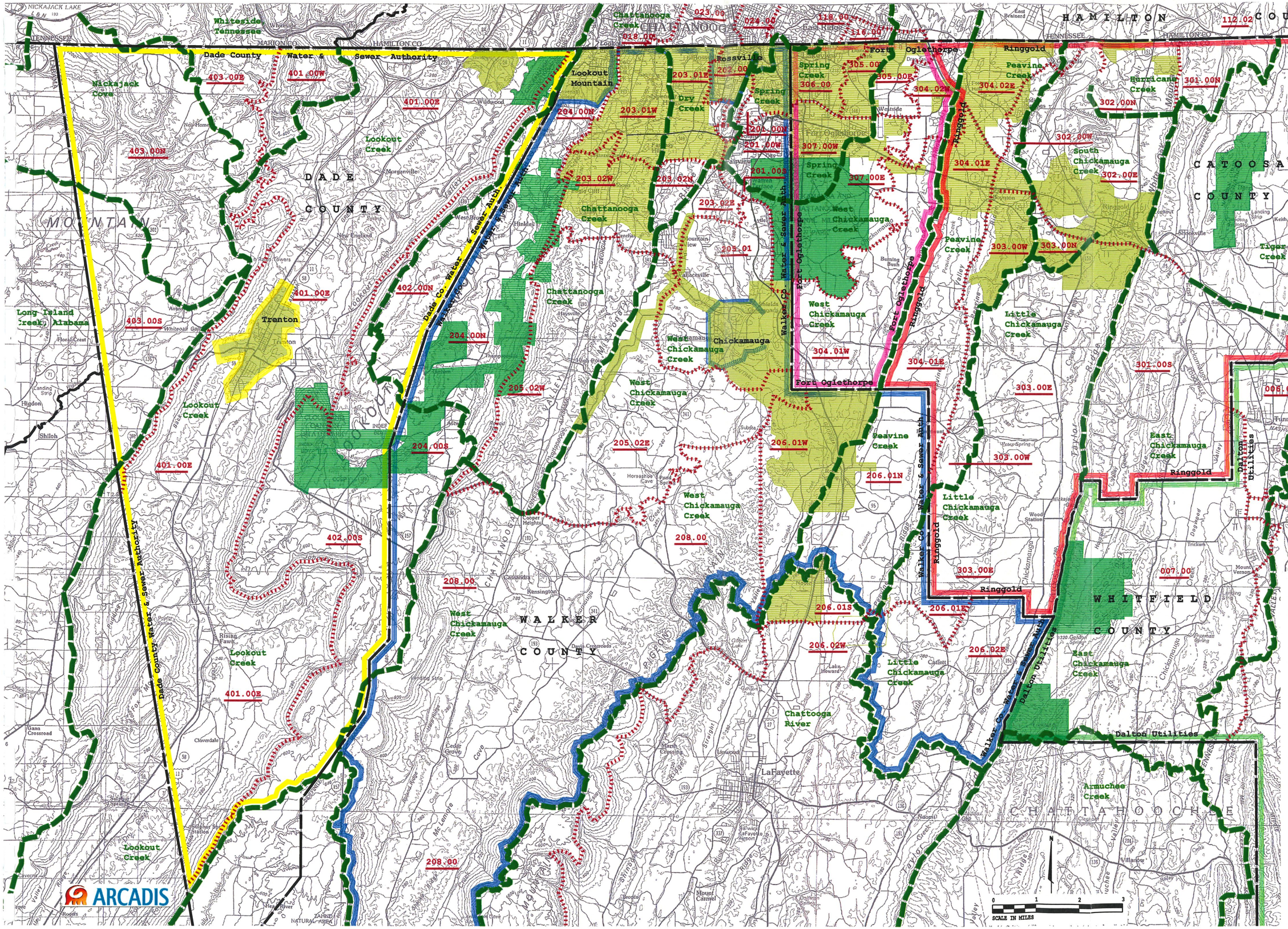
STUDY AREA
EXHIBIT 1

NORTHWEST GEORGIA REGIONAL WASTEWATER TREATMENT STUDY

COOSA VALLEY REGIONAL DEVELOPMENT CENTER

ARCADIS

SCALE IN MILES 0 1 2 3 4 5



SANITARY SEWER SERVICE AREAS

EXHIBIT 6

NORTHWEST GEORGIA REGIONAL WASTEWATER TREATMENT STUDY

COOSA VALLEY REGIONAL DEVELOPMENT CENTER

City of Ringgold

Under terms of a recent agreement between and among the City of Ringgold, Catoosa County, Catoosa Utility District, the City of Ringgold has been assigned the responsibility to provide service to the eastern 80 percent of Catoosa County in the Hurricane Creek, Tiger Creek, East Chickamauga Creek, Little Chickamauga Creek, South Chickamauga Creek, and Peavine Creek subbasins of the county.

Currently, only the City of Ringgold and a few limited outlying areas are served in the South Chickamauga Creek and Little Chickamauga Creek subbasins. There are approximately 1,100 residential, industrial, commercial, and institutional users in these areas connected to the Ringgold Wastewater Treatment Plant, which has a permitted capacity of .75 MGD. The plant occasionally operates at full capacity and is slated for abandonment when the Ringgold sanitary sewer system is connected to the ISS.

Under the terms of a recent agreement between the City of Ringgold and the City of Chattanooga, a connection to the ISS is in design to provide this service area in excess of 3.00 MGD in ISS capacity, with assurances from Chattanooga that additional capacities will be provided upon base flow demand.

In addition to the system that serves areas in and around its city limits, Ringgold also owns and operates four satellite sanitary sewer systems:

1. The Meadows, a residential development on SR 151 near the Tennessee state line, is completely served by a sanitary sewer collection system designed to ultimately serve 300 homes and transports wastewater via a .25 MGD pump station and force main into facilities owned and operated by the Hamilton County Water and Waste Authority for its ultimate transport to the ISS.

2. Limited Catoosa County areas near Graysville (Council Fire and Council Embers) comprise a total of approximately 50 residences and are served by a sanitary sewer system connected directly to the ISS.

3. Morris Estates residential subdivision located in the Peavine Creek Subbasin has a sanitary sewer collection system that serves approximately 225 homes and is currently connected to an oxidation pond that discharges effluent into South Chickamauga Creek.

4. Peavine Creek Subbasin interceptor system, which the City owns and operates, is a rapidly growing sanitary sewer system that currently serves approximately

1,000 users with a connection to the ISS via a 24-inch-diameter interceptor line and a theoretical hydraulic capacity of 4.00 MGD.

In the nearby Hurricane Creek subbasin, the privately owned and operated Windstone residential community low-pressure sanitary sewer system spans an area of both Catoosa County and Hamilton County and serves only users within its development. Wastewater from this private system is pumped directly into the ISS. There appears to be no current plans for the City of Ringgold to assume ownership, operation, and maintenance of this privately owned sanitary sewer system.

City of Fort Oglethorpe

Under terms of agreements between and among the City of Fort Oglethorpe, Catoosa County, Catoosa Utility District, Walker County, and Walker County Water and Sewer Authority (WCWSA), the City of Fort Oglethorpe has been assigned the responsibility of providing service to the western 20 percent of Catoosa County in the West Chickamauga Creek and Spring Creek subbasins of the county. These agreements and the gravity-operated pumping station and force main portions of the NorthWest Georgia Interceptor (NWGI) sanitary sewer system that were funded and constructed under them have enabled the City of Fort Oglethorpe to abandon and close its wastewater treatment plant. Currently and for the foreseeable future, the City of Fort Oglethorpe and substantial outlying areas in both of these subbasins will be served by the NWGI system.

Under terms of an agreement between the City of Fort Oglethorpe and the City of Chattanooga, wastewater flows now being generated from these basins are directed to the NWGI and its gravity interceptors, pump stations, and force mains, which are owned and operated by the City of Chattanooga under a unique and creative state financed funding plan. This system essentially serves as a part of the ISS and provides a theoretical hydraulic capacity of 11.50 MGD at the Spring Creek Pump Station, along with assurances from Chattanooga that additional capacities will be provided when base flows demand. Approximately 4,750 residential, commercial, industrial, and institutional users are currently connected to this system, both inside and outside the limits of the City of Fort Oglethorpe and in both Catoosa County and Walker County. Almost all of the Walker County connections to this system are residential users located in the Beverly Hills area and business users found along US 27. These users are served by sanitary sewers owned, maintained, and operated by the WCWSA. Plans are underway in both Catoosa County and Walker County to construct sanitary sewer collectors in areas of these basins that are not currently served.

In addition to the sanitary sewer collection systems connected to the NWGI system, the City of Fort Oglethorpe owns, maintains, and operates a satellite sewer system in the Mitchell Acres residential subdivision. This recently rehabilitated collection system serves approximately 100 homes and wastewater from this system is currently treated in an oxidation pond, which discharges effluent into the West Chickamauga Creek. Design work is currently under way on the West Chickamauga Creek Interceptor which, when completed, will make it possible to abandon this oxidation pond and connect this system to the ISS as well.

In addition to sanitary sewer systems owned, operated, maintained, and managed by the City of Fort Oglethorpe in the West Chickamauga Creek subbasin, there are two privately owned and operated sanitary sewer systems in this subbasin. Green Acres Mobile Home Park owns and operates a private sanitary sewer system that discharges into the East Ridge sanitary sewer system now owned, operated, and maintained by the HCWWTA. The Kinder's Furniture Mall and surrounding businesses also privately own and operate the Direct Connection sanitary sewer system that discharges into the NWGI. There appears to be no current plans for the City of Fort Oglethorpe to assume ownership, operation, and maintenance of these privately held sanitary sewer systems.

City of Chickamauga

The City of Chickamauga provides sanitary sewer service to all residents within the city and a few outside areas. The system is connected to the Chickamauga Wastewater Treatment Plant and serves approximately 2,000 users.

Walker County Water and Sewer Authority

The Walker County Water and Sewer Authority provides sanitary sewer service to approximately 2,000 residential, commercial, industrial, and institutional users in areas connected to the Chickamauga Wastewater Treatment Plant. The service area includes selected sites in and around Rock Spring, Shields Crossroads, Chandler Hollow, and Wallaceville. Although the Chickamauga Wastewater Treatment Plant previously had a capacity of 5.0 MGD, the current permitted capacity is only 3.5 MGD. The plant generally operates at approximately 50 percent capacity, and plans are in place to connect the service area to the ISS when future expansions to the system prove financially untenable.

The Walker County Water and Sewer Authority also provides service to limited additional non-municipal areas of the Dry Creek Subbasin. This sanitary sewer collection system is connected to the ISS via a 24-inch-diameter interceptor with a

theoretical hydraulic capacity in excess of 4.0 MGD (although the currently reserved ISS capacity is less than 2.0 MGD). The system currently serves approximately 1,000 users.

Sanitary sewers connected to the ISS also serve two areas in the Chattanooga Creek Subbasin. The city of Lookout Mountain and some surrounding areas are served by a low-pressure collection system connected to the ISS. This system serves approximately 1,000 residential, commercial, and institutional users, including Covenant College and Flintstone Subdivision in Dade County. Chattanooga Valley areas south to the Flintstone area, with approximately 1,000 current users, are also served by a sanitary sewer system owned, operated, and maintained by the Walker County Water and Sewer Authority. This system is connected to the ISS via a 30-inch-diameter interceptor sewer with a theoretical hydraulic capacity in excess of 6.0 MGD.

City of Rossville

The City of Rossville owns, operates, and maintains a sanitary sewer system in the Dry Creek Subbasin that connects directly to the ISS. This system serves approximately 1,750 residential, commercial, industrial, and institutional users. It is connected directly to the ISS by a 30-inch-diameter interceptor sewer with a theoretical hydraulic capacity of over 6.0 MGD (although the currently reserved ISS capacity is only 3.5 MGD).

City of Lookout Mountain

The City of Lookout Mountain owns, operates, and maintains a sanitary sewer system that serves users within the city boundary and limited surrounding areas of the mountains via a low-pressure system of approximately 1.0 MGD in capacity. Although Covenant College and the Flintstone residential subdivision are both connected to the Lookout Mountain system, the City has expressed a desire to see other arrangements made to accommodate these Dade County users.

City of Trenton

The City of Trenton owns, operates, and maintains a sanitary sewer system that serves properties within the city boundary and limited surrounding areas of the Lookout Creek Subbasin. These areas are connected to the Trenton Wastewater Treatment Plant, which has a permitted and current capacity of 1.0 MGD and discharges treated effluent into Lookout Creek. This sanitary sewer system now serves approximately 750 residential, commercial, industrial, and institutional users.

Dade County Water and Sewer Authority

Construction is under way in the northern portion of Dade County within the Lookout Creek Subbasin to connect the SR 299 interchange on I-24 with the ISS. This system consists of collector sewer lines into an 18-inch-diameter gravity interceptor with a theoretical hydraulic capacity of over 2.0 MGD that empties into the wet well of a pump station with a force main that ties directly into the ISS. It will be the first significant development of sanitary sewer service in Dade County, outside the city of Trenton

Optimum Performance With Existing System

The ability to facilitate long-term growth with existing facilities in the study area varies widely. Some parts of the study area have made provisions to facilitate substantial expansion of their sanitary sewer systems. Others have taken the necessary steps to begin making such provisions. For still others, little or no capacity is currently available. This section explores the prospects for minor investments or procedural changes to yield substantial improvements in system performance and enable more effective use of limited capital and staff resources.

Sporadic violations of environmental regulations are reported in various places within the study area, but no serious, chronic problems appear to exist without having been addressed. The primary limitation on available wastewater treatment and transfer facilities appears to be excessive infiltration/inflow (I/I), which plagues many of the older gravity-operated sanitary sewer collection and interceptor systems. This specific problem is addressed in detail in the next section. Excess I/I consumes valuable peak hydraulic capacity in existing facilities, limiting effectiveness.

Subbasin Preparedness for Expansion

Regarding the ability to facilitate long-term growth with existing facilities, the 13 subbasins in the study area can be grouped into three categories: prepared, preparing, and unprepared.

Prepared Subbasins

Of the 13 subbasins in the study area, four exhibit sufficient capacity to address the long-term wastewater management needs of their respective areas. All four of these subbasins – Peavine Creek, Dry Creek, Spring Creek, and Chattanooga Creek – are connected to the ISS:

Peavine Creek Subbasin - A 24-inch-diameter gravity-operated sanitary sewer interceptor with a theoretical hydraulic available capacity of over 4.0 MGD was constructed in 1995 to enable expanded service to eventually reach the entire subbasin, throughout which collector systems have been continuously added. Plans call for the program of on-going system expansion to continue until all of the most densely developed and developing parts of the subbasin are served.

Spring Creek Subbasin - In 1998, construction began on the NWGI pump station and force main with a theoretical hydraulic capacity of 11.5 MGD to enable expanded service to both Catoosa County and Walker County areas of this subbasin (as well as the Catoosa County portion of the West Chickamauga Creek Subbasin). A program of collector system expansion is scheduled to continue for the foreseeable future to serve this, the most densely populated subbasin in the study area.

Dry Creek Subbasin - The City of Rossville has been connected to the ISS since the 1950s, long having a 30-inch-diameter gravity-operated sanitary sewer interceptor in place with a theoretical hydraulic capacity of over 6.0 MGD. The WCWSA has a 24-inch-diameter gravity-operated sanitary sewer interceptor also in place nearby with more than 4.0 MGD in theoretical available capacity.

Chattanooga Creek Subbasin - Since the mid-1970s, a 30-inch-diameter gravity-operated sanitary sewer interceptor has been in place with a theoretical available hydraulic capacity of over 6.0 MGD. Sanitary sewer collector system expansion has continued sporadically since that time.

The two primary needs in these four subbasins appears to be the continued extension of sanitary collector sewer systems throughout all of the intensively developed and developing areas of each basin not yet served and substantially controlling I/I to optimize their available capacity.

Preparing Subbasins

Measures to provide for long-term growth have commenced in six of the remaining nine subbasins within the study area. These subbasins have been included in planning and design of new connections to the ISS:

South Chickamauga Creek Subbasin - The City of Ringgold, in a partnership with the City of Chattanooga, has begun survey and design work toward construction of a proposed 3.0 MGD pump station and force main to enable abandonment of the existing Ringgold Wastewater Treatment Plant, to direct wastewater flows to the ISS, and to accommodate future collection system expansion into three additional upstream subbasins. However, further investment in subbasin-specific capacity will be required to be able to accommodate

the substantial population growth that has already taken place as well as the rapid growth projected in the future.

Little Chickamauga Creek Subbasin - The Rollins Industrial Park has long been served by the Ringgold WWTP and will continue to be served by the proposed high-capacity pump station and force main to be constructed under a partnership between the City of Ringgold and the City of Chattanooga.

Hurricane Creek Subbasin - Two existing collection systems already direct wastewater from separate developments into the ISS by varied and un-coordinated means. The City of Ringgold, in partnership with the City of Chattanooga, has begun survey and design work toward the proposed construction of a future high-capacity pump station to be located on Hurricane Creek near its confluence with South Chickamauga Creek and near the mid-point of the proposed force main from Ringgold that is now in design as well.

West Chickamauga Creek Subbasin in Catoosa County - The City of Fort Oglethorpe, in an extension of their existing NGWI partnership with the City of Chattanooga, has begun survey and design work toward construction of proposed large-diameter gravity-operated sanitary sewer interceptors as well as a 3.0 MGD pump station and force main to direct current and future waste water flows from this developing area into the ISS, via the NWGI.

West Chickamauga Creek Subbasin in Walker County - Plans are in place to maximize use of the available capacity in the existing 3.5 MGD Chickamauga Wastewater Treatment Plant (now operating at 60 percent capacity) and address the need for more capacity at a later date.

Lookout Creek Subbasin - Dade County and the Dade County Water & Sewer Authority are now commencing Phase I construction of a 18-inch-diameter gravity-operated sanitary sewer interceptor as well as a pump station and force main to direct current and future wastewater flows from Wildwood (and also future flows from areas further south) into the ISS. However, substantial efforts will soon be needed to extend this system further south and into parts of the subbasin with higher population densities, if long-term solutions are to be provided.

Unprepared Subbasins

The remaining three subbasins in the study area will need substantial investments to address the current needs for sanitary sewer service and to accommodate the long-term growth anticipated within each subbasin.

East Chickamauga Creek Subbasin - Substantial population growth has already occurred and rapid future growth is projected; however, there are currently no sanitary sewers in place.

Tiger Creek Subbasin - Substantial population growth has already occurred and rapid future growth is projected; however, there are currently no sanitary sewers in place.

Other Dade County Subbasins - It is anticipated that Dade County will take steps to control growth in the areas of Dade County that lie outside the Lookout Creek subbasin.

Alternative, unconventional systems, such as on-site sand filter, drip-irrigation, constructed wetlands, mound or land-application, are currently being considered as well as pump station-force main connections to the Trenton wastewater treatment plant.

Existing Collection Systems

Collectors

The overwhelming majority of sanitary collector sewers now in place within the study area are gravity-operated systems. The privately owned and operated Windstone sanitary sewer system and the publicly owned and operated City of Lookout Mountain sanitary sewer system are both low-pressure-distributed, pump-operated systems that use either individual user grinder pumps and/or septic tank effluent pumps. In a number of places, otherwise completely gravity-operated sanitary sewer systems have small, local pumping stations that interconnect isolated areas to other gravity-operated collection or interceptor systems. Gravity sewers found in the study area vary widely in size, materials, design, and condition. A number of older systems are undersized and suffer from blockages and excessive I/I.

Pumping Stations

Most of the sanitary sewage pumping stations now in use throughout the study area are localized and small capacity systems. The exceptions are the NWGI pumping stations, which serve the Spring Creek and West Chickamauga Creek subbasins and are owned, operated, and maintained by the City of Chattanooga and two other similar pumping stations that have been proposed and are now in design. One of the proposed pumping stations will serve the Catoosa County portion of the West Chickamauga Creek Subbasin. The other will serve the City of Ringgold and will eventually serve a much larger area, including the Little Chickamauga Creek, East Chickamauga Creek, and Tiger Creek subbasins. Both of these pumping stations, now in design, will eventually be operated and maintained by the City of Chattanooga. All other sanitary sewage pumping stations are comparatively small-capacity, duplex pump, public system facilities or site-specific, single-user, individual units.

Since various agencies have been responsible for the design and construction of the pumping and pressure systems built at various times within the past several decades and found throughout the study area, no serious attempt has been made to standardize the design, construction, operation, and maintenance of these systems.

Force Mains

Most of the sanitary sewage force mains now in use throughout the study area are small in diameter and serve small, localized sub-systems. The same few exceptions apply as with the pumping stations: the two large-capacity NWGI force mains, which serve the Spring Creek and West Chickamauga Creek subbasins and are owned, operated, and maintained by the City of Chattanooga and two other similar force mains that have been proposed and are now in design. One of these will serve the Catoosa County portion of the West Chickamauga Creek subbasin. The other will serve areas around and upstream from the City of Ringgold in the South Chickamauga Creek, Little Chickamauga Creek, East Chickamauga Creek, and Tiger Creek subbasins (and eventually the Hurricane Creek subbasin). All other sanitary sewer system force mains are either small-diameter public system facilities or very small-diameter lines serving single-user, individual units.

Since various agencies have been responsible for the design and construction of the pumping and pressure systems built at various times within the past several decades and found throughout the study area, no attempt has been made to standardize the design, construction, operation, and maintenance of these systems. The various existing small-diameter sanitary sewer force mains are of either polyvinyl chloride (PVC) or ductile iron pipe.

Oxidation Ponds

There are three oxidation ponds currently in operation within the study area. Each is at least 30 years old. The Morris Estates oxidation pond serves 225 residences in the Peavine Creek Subbasin. The Mitchell Acres oxidation pond serves 100 residences in the West Chickamauga Creek Subbasin. The Ray's Trailer Park oxidation pond serves approximately 20 residents in the West Chickamauga Creek Subbasin. Plans are being made to abandon all three as soon as facilities become available to connect the affected collection system to systems connected to the ISS.

Wastewater Treatment Plants

There are three wastewater treatment plants currently operating within the study area. Two of these plants are more than 20 years old. Any of these facilities that will be used over the long-term may require substantial investments due to the normal wear and tear on electro-mechanical systems and may also need improvements to continue to comply with ever-more strenuous regulations.

The existing 0.75-MGD Ringgold Wastewater Treatment Plant is currently operating at approximately 70 percent capacity during times of dry weather but frequently experiences daily wet weather peaks of twice its capacity. This facility has been slated for abandonment as soon as a pumping station and force main have been constructed to enable Ringgold area wastewater to be transferred into the ISS for treatment in the Moccasin Bend Wastewater Treatment Plant and treated effluent to be discharged into the Tennessee River.

The 3.5-MGD Chickamauga Wastewater Treatment Plant is currently operating at approximately 60 percent capacity during times of dry weather but has experienced wet weather peaks of almost twice its capacity. There are currently no plans for it to be abandoned. Instead, plans by the WCW&SA call for increasing it to a permitted capacity of 6.0 MGD or more as demand increases.

The 1.0-MGD Trenton Wastewater Treatment Plant currently operates at less than 20 percent capacity during times of dry weather but experiences regular wet weather daily peaks in excess of its permitted capacity. There are currently no plans for abandonment of the treatment plant, hoping instead to free wet-weather capacity by reducing system-wide extraneous flows. Plans call for the eventual abandonment of this facility when a system has been provided to convey wastewater from the Trenton area to Moccasin Bend Wastewater Treatment Plant for treatment and discharge of treated effluent into the Tennessee River.

Infiltration and Inflow

Analysis of Infiltration and Inflow

Most gravity sanitary sewer systems constructed prior to 1975 and even some since that time have used materials and methods that allow excessive infiltration/inflow (I/I) to penetrate the system, occupying valuable limited capacities downstream. Most of the agencies in the study area have already begun programs intended to identify and reduce sources of I/I. To better optimize the performance of gravity-operated sanitary sewer systems, significantly more attention must be directed toward the detection and correction of these sources of I/I. Maintenance budgets will likely need to increase.

There are eight specific zones within the study area where older gravity-operated sanitary sewer systems exist with conduits that have not yet been fully rehabilitated. The ownership and location of these systems are as follows:

1. The City of Ringgold in the South Chickamauga Creek Subbasin (many portions of the core downtown system).

2. The Morris Estates residential subdivision in the Peavine Creek Subbasin (the entire collection system of this residential subdivision).

3. The City of Fort Oglethorpe in the Spring Creek Subbasin (many parts of the Old Post collection system as well as the full length of the Black Branch interceptor sewer).

4. The City of Chickamauga in the Walker County portion of the West Chickamauga Creek Subbasin (many portions of the old City system and substantial portions of the interceptors).

5. The Green Acres Mobile Home Park in the Catoosa County portion of the West Chickamauga Creek Subbasin (the entire park sanitary sewer system).

6. Direct Connection/Kinder's Furniture Mall in the Catoosa County portion of the West Chickamauga Creek Subbasin (the entire business park sanitary sewer system).

7. The City of Rossville in the Dry Creek Subbasin (selected areas of the older parts of the City system).

8. The City of Trenton in the Lookout Creek Subbasin (most of the old City system).

Reduction of Infiltration and Inflow

It is not uncommon for gravity-operated sanitary sewer systems to experience some degree of I/I. Minor leaking is not a major concern. When I/I becomes significant, however, it can be costly to correct. In addition, significant I/I can be an indication of corresponding exflow/exfiltration (E/E), when wastewater exits gravity-operated systems and enters the environment during periods of low groundwater and low stream flow, threatening public health and damaging ecosystems.

Another problem created by excessive I/I is the financial impact of treating large volumes of extraneous flows that should not be in the system. According to the U.S. Environmental Protection Agency (EPA), I/I is considered excessive when the cost to continue treating extraneous flow is greater than the cost to correct it. Among costs

associated with I/I are potential fines and other regulatory actions that result in unnecessary expense to the sanitary sewer system.

One of the most significant problems associated with excessive I/I in the study area is that it consumes limited available collector, interceptor, pumping, force main and treatment capacity. Providing larger and more expensive facilities to accommodate the occasional wet-weather peak flows that occur because of I/I can exponentially increase the life-cycle cost of the ownership, operation, maintenance, and management of a system.

In an effort to reduce excessive infiltration and inflow, it is recommended that aggressive measures be taken in each of the eight study area zones identified as having the greatest likelihood of experiencing excessive I/I. For purposes of this study, the primary goal of these measures would be to minimize the negative impact of I/I on the limited available capacities for wastewater transfer and treatment.

There are four locations where I/I enters a gravity-operated sanitary sewer system: (1) main interceptor lines that follow stream courses; (2) collector lines; (3) manholes; and (4) service lines. In some situations, mere point repairs may be adequate. In others, conduit lining and other in-place rehabilitation technologies should be explored. Still other settings may require the complete replacement of failed gravity-operated sanitary sewer system facilities. In any case, when sanitary sewer evaluation surveys are conducted on portions of these affected systems, the impact of I/I from the user service lines should be investigated to determine whether substantial rehabilitation of service connection lines should also be a part of the correction plan. Regardless of expenditures, efforts will be completely unproductive unless I/I reduction is achieved.

Although excessive I/I is common, it is among the primary operational problem facing providers of sanitary sewer service within the study area. Steps to remedy this situation include the following:

1. Implement more stringent design, specification, materials, methods, and construction standards and inspect and monitor closely all construction of sanitary sewer collection and service lines within the system for which each provider is responsible. Early efforts can provide a cost-effective strategy to prevent operational and maintenance issues from becoming costly problems after construction is complete.

2. Conduct sanitary sewer evaluation surveys of areas of potential concern to identify properly functioning areas, thereby enabling providers to focus on the most likely problem areas.

3. Establish an appropriate maintenance schedule, including periodic, on-site visual inspections and video documentation of each gravity sanitary sewer line within the system for which each provider is responsible. Maintenance schedules will allow providers to track specific concerns, facilitate analyses, and schedule rehabilitation efforts and other corrective measures more efficiently.

4. Budget and fund operational and maintenance activities adequately so that efforts to control problems can be conducted regularly. This will reduce "crisis management" response, which is more costly and less effective.

Population Projections

Practically all available sources predict substantial continued growth throughout the study area for this report. The issues of population trends and projections and build-out numbers for the study area are addressed in greater detail in Appendix C.

The U.S. Census Bureau projects continued rapid growth in Georgia population.[7]

Source	Year 2000 (1,000)	Year 2005 (1,000)	Year 2015 (1,000)	Year 2025 (1,000)
Series A	+9.4% 7,875	+6.8% 8,413	+9.4% 9,200	+7.3% 9,869
Series B	+9.6% 7,893	+8.2% 8,540	14.6% 9,785	12.0% 10,962
Average	+9.5% 7,884	+7.5% 8,477	12.0% 9,492	+9.7% 10,416
Actual	+13.7% 8,186			

Notes:

In addition to the two series of projections provided by the census bureau, an additional averaged figure is provided for comparison.

Figures assume a 1995 population of 7,201,000.

Actual year 2000 census bureau count was 8,186,453.

Source: U.S. Census Bureau website, 2003.

[7]USCB website, March 31, 2003.

As shown, the 2000 projections that were based on 1995 estimates, Georgia population figures continue to increase at an unexpectedly rapid rate. Annual growth rates of 1 percent (10 percent per decade) are not overly optimistic. A front-page story in the *Chattanooga Times Free-Press* (April 17, 2003) issued an almost alarmist projection of rapidly increasing population in North Georgia as summarized in Exhibit 7.[8]

Almost 70 percent of metropolitan Chattanooga population growth is in North Georgia. Exhibit 7 is a list of the census bureau's 2002 population estimates and growth rates for the study area and other nearby communities.

EXHIBIT 7

2002 Population and Growth Rate Estimates
North Georgia Study Area

Location	Increased / Decreased	Rate (percent)	From	To
Tennessee Counties				
Hamilton County	Increased	+0.3	308,396	309,321
Bradley County	Increased	+0.9	88,867	89,677
McMinn County	Increased	+0.7	49,703	50,051
Rhea County	Increased	+1.1	28,627	28,939
Marion County	Decreased	-0.2	27,709	27,654
Grundy County	Increased	+0.5	14,264	14,335
Bledsoe County	Increased	+0.1	12,466	12,478
Sequatchie County	Increased	+1.9	11,567	11,787
Meigs County	Increased	+0.7	11,231	11,310
Georgia Counties				
Catoosa County	Increased	+2.8	54,818	56,341
Dade County	Increased	+1.3	15,415	15,615
Walker County	Increased	+0.4	61,702	61,949
Whitfield County	Increased	+1.5	85,751	87,037
Murray County	Increased	+2.0	37,798	38,554
Chattooga County	Increased	+1.1	25,975	26,261

[8]Flesner, Dave. "Population Spreads to South," *Chattanooga Times Free-Press*, front page, April 17, 2003.

EXHIBIT 7

2002 Population and Growth Rate Estimates
North Georgia Study Area

Location	Increased / Decreased	Rate (percent)	From	To
Alabama Counties				
DeKalb County	Decreased	-0.1	65,671	65,605
Jackson County	Decreased	-0.2	54,143	54,035

Source: U.S. Census Bureau, 2002.

If, in fact, the Catoosa County population increased by 2.8 percent in 2002, adding 1,523 new residents, what should be considered realistic estimates of future growth? Some planners quoted in the article estimate North Georgia's population will double within the next two decades. If so, using the 2002 population figures above, consider the potential impact of such growth in 2022:

	Population Increase	
	From	To
Catoosa County	56,341	112,682
Dade County	15,615	31,230
Walker County	61,949	123,898
Whitfield County	87,037	174,074

Note: Assumes ARCADIS-estimated annual growth rate of 3.65 percent.

Future Conditions

General Observations

For purposes of this study, estimates of future wastewater flows are based almost exclusively upon projected population trends. These population projections are based largely on observations of significant recent changes in localized population densities and other trends in area demographics.

Nationally, regionally, across Georgia, and in the study area, although populations continue to increase, household size has dropped steadily every decade since at least the 1940 census. The result is a more rapid increase in number of households than underlying population growth figures would suggest. A number of causes have been

suggested for this trend that contributes to service sprawl and increases the cost of service delivery:

1. The substantial increase in single-parent and/or never-married households, which tend to be smaller in size.

2. A much higher percentage of married couples that limit both conception and birth, reducing the overall family and household size.

3. Divorce rates have also risen significantly. Most divorces technically create a new household with no corresponding increase in actual population.

4. Children are tending to leave home earlier, establishing more single-person households even when there is no increase in actual population.

5. More elderly people continue to maintain their own households after becoming widowed, contributing to smaller household sizes. In addition, elderly people are living longer lives, thus maintaining single households for longer periods.

Due to these and related social-demographic trends, established communities such as those in the study area have often more than doubled the number of households while simultaneously experiencing a stable or even a decreasing population.

Additionally, the impact of the natural "baby boom" cycle has been felt both on the local level and in community demographics across the country. Densely populated post-war communities of 1950, 1960, and 1970 typically consisted of two parents and three or four (or more) young school-age children at home in a nuclear family unit. Many of these same homes in the same communities at 1990 and 2000 census time were often populated by one or two of the same people, who had become longtime empty-nest grandparents with no other family members at home. The result could be a local community with the same or even a larger number of households as in 1970, but having experienced as much as a 70 percent population drop. It has been observed that the most densely populated parts of the study area experienced the slowest, and in some cases negative, growth from 1970 to 2000. It was the areas most sparsely populated in 1970 that experienced the greatest rates of population increase in the intervening decades.

Planning Period

The projected growth in population reflected in the figures found on Exhibit 6 is indicated in even 5-year increments through the year 2025. County-wide population projection data as found in the 1999 Joint Comprehensive Plan prepared by the staff of the Coosa Valley Regional Development Center (CVRDC) in conjunctions with the North Georgia Regional Development Center (NGRDC) were used as a basis for projected 2005, 2010, and 2015 populations and generally distributed evenly by subbasin. As instructed by most representatives of the affected agencies, a parabolic projection of the rate-of-growth curves was used to project subbasin populations for the years 2020 and 2025. The results of these projections are provided in Exhibit 8.

Land Use Projections

As noted in the introduction, with few exceptions, of the three general development categories (residential, commercial, and industrial), the overwhelmingly predominant land use within the study area is residential. Over the past decades, rural agricultural lands within the study area have developed primarily for low-density-suburban-residential use. Based on available data, there is no reason to think that this trend will not continue. Easy accessibility to workplaces in Chattanooga and Dalton (via I-75, I-59, and US 27) means that rather than a few concentrations of dense population, there will be a tendency toward increasing development of some of the more sparsely populated parts of the study area. Existing agricultural areas, vacant lands, and open spaces will likely become the new suburban single-family residential subdivisions of the future.

Population Projections

According to information reported in the original 201 study and provided by the USCB, between the 1970 and 2000 census counts, the population of the study area grew dramatically. Population projections reported in the Joint Comprehensive Plan anticipate these trends to continue and increase. Representatives of most of the affected agencies agreed that this rise in the rate of increase will likely continue at least through the study period for this report.

There are nine public agencies that have assumed or been assigned the task of providing sanitary sewer services. The impact of population projections on anticipated wastewater flows and existing facilities is addressed separately by each agency. For reference purposes, the extent of the areas served by each of these agencies is shown on Exhibit 9.

The total 2000 population of the study area (121,081) is less than 5 percent more than was predicted in 1975 (115,635).[9] What is significant is that highest-density areas are either growing very slowly, are stable, or are actually decreasing in population, while the more remote and sparsely populated areas are growing much more rapidly than was predicted. The study area is an example of suburban sprawl in practice.

The rapid growth in population, coupled with the availability of improving public water supply and distribution systems and the increase in per-person water use, means that substantially higher wastewater flows are being generated within the study area than were predicted in 1975. Using the county-by-county population projections found in the CVRDC-NGRDC joint plan, it is anticipated that these higher wastewater flows will grow dramatically in the decades ahead. These projected populations are shown by subbasin for the milestone years 2005, 2010, 2015, 2020, and 2025 in Exhibit 8.

In addition to these figures, theoretical "built-out" populations for each subbasin are also shown on Exhibit 8, based on the best available data provided by the affected agencies. The year 2000 population for the 649.33-square-mile study area was 121,081, with an aggregate population density of 186 per square mile. The study area subbasin with the lowest population density was Lookout Creek in Dade County at only 90 per square mile ("Other Dade County Areas" was even lower at 73 per square mile). By far, the subbasins with the highest population density were Spring Creek and Dry Creek, at 1,505 and 1,401 people per square mile, respectively, even though Spring Creek densities were lower than in 1970.

Flow Projections

The estimated 2025 wastewater flow for each subbasin that would result based on the projected population and the per-capita rate-of-flow figures were projected and used for such calculations. The year 2025 wastewater flow projection for the study area is 53.8 MGD, including peak flow and I/I allowances.

The year 2025 projected population for the study area is 215,216, resulting in an area-wide density of 331 per square mile. It is projected that the Lookout Creek Subbasin population density will more than double to 206 per square mile, but the Spring Creek and Dry Creek subbasins population densities are expected to rise much more modestly to 1,884 and 1,755, respectively. The Hurricane Creek Subbasin population density is

[9]Not including "Other Dade County Areas" outside of the original 201 study.

ARCADIS

Discrete Drainage Subbasins and Parent Census Tract Subdivisons	Sub-tract Area (sq. miles)	201 Study-Reported 1970 Pop.**	Calculated Basin 1970 Pop.Density	Additional Comment
Hurricane Creek (Catoosa)				the population growth of this sub-basin was triple what was predicted, even this
302.00N	4.76			higher population density is expected to grow at a rapid rate in the future. Presence
	4.76	604	127/sq.m	g sanitary systems just upstream may indicate the need for cooperative solutions.
Tiger Creek (Catoosa/Whitfield)				
001.02W	11.09			icate population growth in this sub-basin was well over double what was predicted,
301.00E	28.36			e the population density of this sub-basin remains low, both the 2025 and "built-out"
	39.45	1,612	41/sq.m	could actually be much higher even than the projections shown here.
East Chickamauga Creek (Catoosa/Whitfield)				
005.01N	1.65			
006.00W	6.67			
007.00	36.78			icate population growth in this sub-basin was over 15-fold what was predicted,
301.00S	22.69			e the population density of this sub-basin remains low, both the 2025 and "built-out"
	67.78	676	10/sq.m	could actually be much higher than the projections shown here.
Little Chickamauga Creek (Catoosa)				
303.00E	26.19			icate population growth in this sub-basin was over 10-fold what was predicted, and
	26.19	1,725	66/sq.m	atively low population density, 2025 numbers could be even higher than shown here.
South Chickamauga Creek (Catoosa)				
302.00E	13.31			
303.00N	1.87			relatively densely populated, this area did not grow as fast from 1975 to 2000
	15.18	4,799	316/sq.m	een anticipated. It could similarly be projected that it will not grow as fast to 2025.
Peavine Creek (Catoosa)				
302.00W	0.95			
303.00W	9.35			
304.01E	11.51			
304.02E	5.00			icate population growth in the sub-basin significantly above what was predicted.
	26.81	4,420	165/sq.m	owth may exceed the capacity of existing infrastructure already provided.
Spring Creek (Catoosa/Walker)				
201.00N	2.77			
305.00W	2.21			the most densely populated sub-basin in the study area, data indicates it actually
306.00	2.52			population from 1975 to 2000. While it may not continue to shrink, it would be
307.00W	2.88			ble to project that it will not grow as fast to 2025 as shown here. In addition,
	10.38	18,769	1808/sq.m	sions already made appear adequate to address anticipated flows well beyond 2025.
West Chickamauga Creek (Catoosa)				
304.01W	11.51			
304.02W	3.34			
305.00E	1.47			
307.00E	8.64			icate population growth in the sub-basin significantly above what was predicted.
	24.95	2,486	100/sq.m	eady under way call for provision of adequate interceptor capacity to this subbasin.
West Chickamauga Creek (Walker)				
203.02E	1.91			
205.01	12.22			
205.02E	21.44			
206.01N	2.66			
206.01E	10.63			
206.01W	10.63			
206.02E	15.21			icate population growth in this sub-basin was very nearly what was predicted, but a
208.00	128.62			at was brought about by the increase in geographical area served via this sub-basin.
	203.31	12,110	60/sq.m	emains relatively sparsely populated, it may also experience faster future growth.
Dry Creek (Walker)				
201.00S	1.39			
201.00W	2.77			
202.00	2.15			
203.01E	3.77			relatively densely populated, this area grew a little faster from 1975 to 2000 than
203.02N	1.91			anticipated. It is projected that it will not grow quite as fast to the year 2025.
	7.83	7,435	949/sq.m	n, the provisions already made appear adequate for projected "built-out" flows.
Chattanooga Creek (Walker)				
203.01W	5.66			
203.02W	5.74			
204.00N	21.90			relatively densely populated, this area did not grow as fast from 1975 to 2000
205.02W	11.55			een anticipated. It could similarly be projected that it will not grow as fast to 2025.
	44.84	9,683	216/sq.m	n, the provisions already made appear adequate for flows well beyond 2025.
Lookout Creek (Dade)				
204.00S	3.86			
401.00E	89.62			
402.00N	31.64			
402.00S	31.64			icate population growth in this sub-basin modestly above what was predicted, but
	133.04	7,211	54/sq.m	ontinues to be very sparsely populated, it may experience faster future growth.
Other Dade Areas				
401.00W	4.72			
403.00E	4.01			
403.00N	20.05			
403.00S	16.04			
	44.81			a was not included in the original 201 facilities plan.
Totals	649.33	71,787	111/sq.m	d 2000 population for the aggregate area is 16.8% above what was predicted in 1975.

* 2000 U.S. Census Bureau ** May 1975 Chattanooga, TN-GA 201 Wastewater F

December 30, 2003

EXHIBIT 8

Study Area Population Status

expected to increase more dramatically than any other in the study area. There it has been projected that densities will rise to as much as 1,370 per square mile.

The projected theoretical built-out population for the study area is governed in part by the maximum densities found in the greater Chattanooga metropolitan area, of which the study area is a part. Historically, even close to the city core, very few areas appear to have exceeded a population density of approximately 3,000 per square mile without suffering significant decline. One reason that study area communities are currently attractive targets for in-migration is their relative low-densities compared to other areas further from downtown Chattanooga. Interstate 75 has also become a high-density corridor, with relative population densities declining further from its interchanges. It is projected that these trends will continue through the year 2025 and beyond, resulting in some balancing of population densities throughout the entire Chattanooga metropolitan area. Consequently, the highest built-out population densities projected for the study area are in the range of 1,500 to 2,000 per square mile, primarily in the areas nearest downtown Chattanooga or along the growing I-75 corridor.

The total combined study area "built-out" population is projected at 474,812, resulting in an area-wide population density of 731 per square mile. The aggregate study area wastewater flows at this theoretical built-out are estimated to be 118.7 MGD. For purposes of this study, unless the estimated built-out flows of a given subbasin are only marginally higher than estimated year 2025 flows, the built-out flows are disregarded in sizing proposed interceptors for that subbasin.

Development of Alternatives

Alternatives developed for consideration in this report focus primarily on the issue of future growth and provision of wastewater treatment service. The operational issues addressed earlier in this report regarding the need for additional sanitary collector sewers in areas already otherwise served and the need for correction of I/I in selected service areas, etc., are not addressed in these alternatives. Those issues must be addressed by agencies providing sanitary sewer service regardless of the alternative selected for implementation.

Service Strategies

Of the 13 subbasins defined for this report, four are prepared to meet their wastewater needs for the foreseeable future, six are now in the process of making preparations, and three are classified as unprepared.

Prepared Subbasins

Major investments have already been made in sanitary interceptor sewer capacity by local, state and federal agencies over the past three decades to provide for existing and proposed development needs in the Peavine Creek, Spring Creek, Dry Creek, and Chattanooga Creek subbasins.

When alternative approaches are considered for meeting the needs of the entire study area, no plans will be made to change the strategies already in place for meeting the long-term needs of these four subbasins. Obviously, additional funds will be required in order to complete the plans now being implemented, but no recommendations will be made to alter the strategies under way.

Preparing Subbasins

Plans are under way in six subbasins to provide for sanitary sewer needs. By means of administrative agreements to address jurisdictional and organizational circumstance and long-range construction program planning to provide services, direction is now being set to address current demands and facilitate future growth. Developments such as this are now taking place in the Hurricane Creek and South Chickamauga Creek subbasins, the Catoosa County portion of the Little Chickamauga Creek Subbasin, and in the Catoosa County and Walker County portions of the West Chickamauga Creek Subbasin. Substantial funds will be required to effect service in these areas.

When alternative approaches are considered for meeting the needs of the entire study area, changes may be suggested that will affect proposed strategies now in place to meet the long-term needs for some of these six subbasins. These alternatives will provide differing levels of service and have varying associated costs.

Unprepared Subbasins

There are three study area subbasins in which no investment has been made for provision of public sanitary sewer service and where no plans for future service have been prepared. The alternatives considered have the most impact on these three subbasins, where direction has not already been set. The East Chickamauga Creek and Tiger Creek subbasins and the areas of Dade County that do not naturally drain into the Tennessee River at Chattanooga are included within this category.

When alternative approaches are considered for meeting the needs of the entire study area, variations among the considered alternatives have the most impact on these three

subbasins. The alternatives that are considered may also result in differing levels of service in one or more of these subbasins and at varying costs.

Alternatives 1, 2, and 3

For purposes of addressing the sanitary sewer service needs of the entire area for the North Georgia Wastewater Study, three alternative approaches were developed. For purposes of comparison, a "no-action" alternative is also shown. In each alternative presented, including the no-action alternative, it will be assumed that intensive development and sanitary sewer system construction will not be recommended for the Sand Mountain areas of Dade County, which do not naturally drain into the Tennessee River at Chattanooga. The alternatives considered for evaluation include the following and will be addressed in greater detail below.

1. Encourage conventional sanitary sewer system development to continue in all of the prepared and some of the preparing parts of the study area. Declare a development moratorium throughout the unprepared parts, as well as portions of the preparing parts where conventional systems may be least cost-effective.

2. Encourage conventional sanitary sewer system development to continue in all of the prepared and some of the preparing parts of the study area. Promote use of decentralized on-site wastewater treatment systems employing any of the range of available new technologies in the unprepared and even parts of the preparing subbasins of the study area.

3. Encourage planned, phased, conventional sanitary sewer system development to continue throughout all parts of the study area subbasins, whether prepared, preparing, or unprepared, directing wastewater flows to the ISS/MBWWTP.

Alternative Comparison

While the annual operation and maintenance expenses of a well-built conventional gravity sanitary sewer system may be minimal and the life cycle costs manageable, the capital cost of this infrastructure investment can be formidable. Unconventional systems may have lower up-front capital and debt service costs, but savings may come at the expense of a disproportionately higher operations, maintenance, and administrative quotient.

All parts of the study area share several benefits enjoyed by few places in the world. All are in close proximity to a receiving stream the size of the Tennessee River at

Chattanooga. All share in the value of having a regional wastewater treatment facility of the scale of MBWWTP available to them, with both a federal mandate and a local commitment to provide wastewater treatment services at an equitable rate to any and all parts of their reasonable service area, regardless of the state in which the users lie. Of the 13 subbasins within the study area for this report, most (with the exception of the Walker County part of the West Chickamauga Creek Subbasin and the other Dade County areas) have ISS connection points already in place at their termini or have plans under way for provision.

The availability of this level of wastewater treatment service at these proximities will naturally color the evaluations of the alternatives addressed below. Unconventional, decentralized on-site wastewater treatment systems that may be attractive in localities without the array of options available here are frequently found to be less competitive in the face of alternatives such as the situation presented in the study area.

Cost-Effectiveness

Since Alternative 1 involves declaring development moratoria on the Tiger Creek and East Chickamauga Creek subbasins as well as the Walker County portion of the Little Chickamauga Creek Subbasin and the more remote parts of the Walker County portion of the West Chickamauga Creek Subbasin and the Lookout Creek Subbasin, Alternative 1 is expected to require less capital less than the other two considered alternatives. By focusing primarily on the prepared subbasins, to simply provide for sanitary collector sewer systems and connect users, limited financial resources can be targeted to those areas in greatest need or with the shortest payback cycles. Among the advantages of this type of approach is a focus on increasing revenue from the customer base potentially served by investments already made. At a later date, decades into the future, the issue of easing these limited development moratoria and then re-addressing long-term wastewater needs can be reconsidered. The trade-off for counties within the study area may be that properties otherwise developable may suffer from this delayed prioritization, which could in turn, have negative impacts on local tax digests.

Alternative 2 is similar to Alternative 1 in many respects but provides a means to see the remote areas develop privately (even intensively) without the investment in up-front capital that is normally associated with a public sanitary sewer system. In this alternative, rather than declaring development moratoria on the remote corners of the Tiger Creek and East Chickamauga Creek subbasins, the Walker County portions of the Little Chickamauga Creek Subbasin, and more remote areas of the Walker County portion of the West Chickamauga Creek Subbasin, as well as the Lookout Creek Subbasin, any private developers would be provided guidance regarding planning and

construction of decentralized on-site wastewater treatment systems employing a range of available technologies for which the appropriate agencies would be willing to assume long-term operations, maintenance, and management responsibilities. While the initial costs of Alternative 2 may be no more than Alternative 1, the long-term operations and maintenance costs as well as administrative expenses, could be high, depending on the level of on-going revenue support provided by the users of such systems. Providing a means to facilitate development in remote areas would enable better uses of the land without expenditures of additional infrastructure capital.

From an up-front capital investment and debt service viewpoint, Alternative 3 can be expected to cost considerably more than the other two alternatives. As demands for development land extend further up the study area subbasins, sanitary sewer service can follow. A phased approach could enable locally controlled economic development as well as enhancement of local tax bases. Countywide land use planning, zoning, and development standards could be used to better manage development. Opportunities to partner with private developers to extend interceptor infrastructure incrementally could also lower the burden of capital requirements from local and state government entities.

Environmental Impacts

Alternative 1 involves declaring a development moratorium on the Tiger Creek and East Chickamauga Creek subbasins as well as the Walker County portion of the Little Chickamauga Creek Subbasin and more remote parts of the Walker County portion of the West Chickamauga Creek Subbasin and the Lookout Creek Subbasin. By forcing development to occur only in areas provided with adequate infrastructure, Alternative 1 would protect delicate environmental resources in more sparsely developed parts of the study area. By targeting development primarily to prepared subbasins, a higher density of development may result in those areas, reducing sprawl. Possible drawbacks include creating levels of congestion in the urbanized and urbanizing parts of the study area that local citizens would find unacceptable.

Significant environmental dangers are associated with Alternative 2 that would not be as likely in either of the other two considered alternatives. Agencies that currently provide sanitary sewer service within the study area would continue to operate, maintain, and manage expanding conventional sanitary sewer systems. In order for more remote, decentralized, sophisticated on-site wastewater treatment systems to adequately operate and protect the environment, higher level operational management skills may be required of study area agencies. Unless commitments to support new levels of technical expertise, attention to detail, and operational expenses are made, environmental and public health protection may suffer. If this alternative is pursued,

coordination will be needed with the Georgia EPD and other environmental protection agencies regarding additional points of discharge or impacts on groundwater. Agencies assuming responsibility for decentralized systems will be expected to stay abreast of state-of-the-art technologies, means, methods, and procedures as well as the regulatory framework needed to adequately protect the environment. If outside contractors are used for these duties, a system of long-term bonding protection may be required.

From the standpoint of operational simplicity, a conventional gravity-operated sanitary sewer system with limited use of pump stations and force mains is optimal. All agencies providing service within the study area have experience with such systems. The primary changes experienced would be those of scale. Use of hybrid systems, in which gravity sanitary sewers are augmented with low-pressure systems (such as that already in place within the City of Lookout Mountain) are not a major departure from conventional technologies. If local service-providing agencies continue their programs of I/I correction and are diligent in ensuring the integrity in new sanitary sewer system construction, protection of the environment and public health should be a manageable mandate. One ultimate goal of Alternative 3 would be elimination of any permitted discharges within the study area. Neither of the other considered alternatives could provide this level of protection to both surface and groundwater resources.

Feasibility

Alternative 1 may be considered most feasible because it requires less initial capital investment. Implementation of development moratoria in some of the more remote parts of the study area would likely reduce sprawl and could reign in runaway residential development. Implementation of this alternative could also enable local governmental agencies to delay the effort needed to assess use of unconventional technologies as well.

In order for Alternative 2 to be considered feasible, a higher level of local agency staff expertise would be required to manage more complex systems in the remote portions of the study area. Since there are already so many unmet needs in existing population centers, it would appear to be unrealistic to imagine that such remote sites would have the priority necessary to adequately protect either public health or the environment. For this and other reasons, Alternative 2 may be the least feasible of the considered alternatives.

If implemented in a carefully phased manner, Alternative 3 could prove to be the most feasible of the considered alternatives. By carefully managing long-range land use plans in the study area, development can be targeted toward existing infrastructure.

Future development in remote areas would be delayed but only until arrangements had been made to extend appropriate services. In this way, the communities represented in the study area could each set a pace consistent with their unique priorities and values. Attention to future expansion could be balanced with improving services in the more urbanized and urbanizing parts of the study area. Use of alternative technologies, such as STEP or STEG systems or low-pressure collectors could augment conventional gravity-operated sanitary collector sewer systems used elsewhere. Based on the forces driving the demand for increased development, it may not be practical to imagine that expansion can be completely restrained, but unless it is better controlled in some parts of the study area, serious sustainability issues may arise in the near future.

No-Action Alternative

The No-Action Alternative involves reducing the pace of growth and sanitary sewer system expansion to which representatives of all local agencies have already expressed commitment. The most negative impact of this approach would be to the infrastructure investments that have already been made. Where limited revenues were expended and future revenues committed through bonds based on an aggressive agenda of providing sanitary sewer service to potential customers, it will be imperative that customers be connected. Unless customers are served and user revenues collected, the infrastructure investments already made become nothing more than unnecessary expenditures. The project costs already incurred were much too high to be allowed to simply languish as potential capacity under-utilized. If the sanitary interceptor sewer system investments proposed in this report are to serve local communities and citizens, there must be a parallel commitment to construct collector systems so that the paying customers can be connected. Otherwise, resources will have been wasted.

In each of the study area subbasins where no significant expenditure has been made to date, the question of how best to proceed is primarily political. Each community must determine the level of investment it is willing to make and whether the benefits to be derived (or impacts avoided) are worth the investment.

Selected Alternative

Based on consistent commitments by the representatives of the local public agencies to welcome and manage area growth, Alternative 3 has been selected as the recommended course of action. Initially, there will be little difference between the impact of Alternative 1 and Alternative 3, if a phased approach to the selected alternative is used to focus resources disproportionately on areas where infrastructure investments have already been made. It is recommended that promotion of

decentralized, on-site wastewater treatment alternatives be discouraged within the study area at this time. Further development in remote areas without adequate infrastructure should be delayed until such time as funding priorities facilitate the provision of the interceptor sanitary sewer capacity that can appropriately address the needs of that proposed development.

In each of the affected subbasins, counties and sanitary sewer service jurisdictions of the study area, long-range land use planning should precede any proposed extensions of sanitary infrastructure sewer systems. Specific land use plans should be adopted and updated as necessary and followed in planning and zoning decisions. The development controls that benefit sanitary sewer system investments will also be essential to protect the investment of other public funds as well. Among the other public investments that will also benefit from well-planned growth are the following:

1. Water source development and filtration systems, area-wide system inter-connections, pumping, storage, transmission and distribution systems and the fire protection facilities they support will be more effective.

2. Roadway system enhancements, whether addressing widening, intersection improvements, or other capacity or traffic flow issues, can be maximized.

3. School construction and provision of recreational and other public facilities can be targeted to the specific areas where population concentrations indicate.

Following adequate land planning, it is recommended that a strategy be implemented to serve the sanitary sewer needs of both those in areas where adequate interceptor capacity already exists and developing properties in close proximity to the existing infrastructure. By extending gravity sanitary interceptors to each subbasin in a phased and methodical manner, existing needs can be met, long-term indebtedness can be minimized, and the demand for new development can be addressed.

Detailed Description of Selected Alternative

The selected alternative involves providing sanitary interceptor sewer capacity to all study area subbasins adequate to receive anticipated wastewater flows from projected 2025 populations. A delineation of the proposed interceptors can be seen in Exhibit 9. With the exception of the Spring Creek Subbasin, some level of improvement has been proposed for each study area subbasin, whether it is classified as prepared, preparing, or unprepared. Obviously, the better-prepared areas will require relatively less in the

Dade County Water & Sewer Authority

Dade Co. Water & Sewer Auth.

Walker Co. Water & Sewer Auth.

Fort Oglethorpe

Dalton Utilities

Whiteside, Tennessee

Nickajack Cove

Long Island Creek, Alabama

Trenton

1.0 MGD WWTP

Lookout Creek

Lookout Mountain

Chattanooga Creek

Dry Creek

Rossville

Spring Creek

West Chickamauga Creek

3.5 MGD WWTP

Peavine Creek

Ringgold

Little Chickamauga Creek

Hurricane Creek

Tiger Creek

South Chickamauga Creek

East Chickamauga Creek

Conasauga River

Chattooga River

Armuchee Creek

10.0 MGD

DADE COUNTY

WALKER COUNTY

CATOOSA COUNTY

WHITFIELD COUNTY

HAMILTON COUNTY

CHATTANOOGA

LaFayette

Ringgold

Dalton Utilities

LEGEND

Spring Creek — SUB-BASIN NAME

SUB-BASIN BOUNDARY

SEWERED AREAS

RESERVED AREAS

EXISTING INTERCEPTOR

PROPOSED INTERCEPTOR

EXISTING WWTP

PROPOSED PUMP STA.

PROPOSED INTERCEPTORS

EXHIBIT 9

NORTHWEST GEORGIA REGIONAL WASTEWATER TREATMENT STUDY

COOSA VALLEY REGIONAL DEVELOPMENT CENTER

SCALE IN MILES 0 1 2 3

ARCADIS

way of construction to address their capacity needs than areas that are currently unprepared.

Where sanitary interceptor sewers are proposed, large-diameter piping is generally to be constructed at the mouth of each subbasin with pipe sizes decreasing as interceptors extend further upstream. In some cases, pump stations and force mains are proposed to connect remote systems to distant wastewater transmission targets. For purposes of this report, interceptors 15 inches or less in diameter are considered small-diameter and those 18 inches or more in diameter are considered large-diameter. The study area subbasins will be addressed in order of their level of preparedness.

Prepared Subbasins

For almost a decade, Catoosa County has invested in the Peavine Creek Interceptor System to facilitate sanitary sewer service in the rapidly developing Catoosa County portion of the Peavine Creek Subbasin. It is estimated that an additional 52,873 linear feet of sanitary interceptor sewer construction will be needed to enable this subbasin to be completely served. Sanitary sewer collector systems will also be required, but the backbone of the system is in place and the long-term needs have been addressed.

Likewise, both the Catoosa County and Walker County portions of the Spring Creek Subbasin benefit from the recent completion of the NorthWest Georgia Interceptor system, a series of gravity interceptors, pump stations and force mains constructed in a unique partnership between the City of Fort Oglethorpe and the ISS/MBWWTP. This system serves long-term capacity needs for both this entire subbasin and the Catoosa County portion of the West Chickamauga Creek Subbasin. A substantial investment remains to be made in sanitary sewer collector systems, etc., but there appears to be no need for further, large-diameter interceptors, which appear to be adequate for future demands. A small remote section of this subbasin is included as part of the Dry Creek Subbasin.

Large-diameter interceptor sanitary sewers have long been in place in the Dry Creek Subbasin, and a substantial percentage is already being served. Service for a small remote section of the Spring Creek Subbasin will require a pump station and force main. Otherwise, it is estimated that an additional 14,210 linear feet of interceptor extensions and more collectors will be needed, the primary trunk lines are in place for future needs.

Similarly, large-diameter interceptors have been in place in the Walker County portion of the Chattanooga Creek Subbasin for decades. It is estimated that an additional

49,096 linear feet in smaller-diameter interceptors will be required to serve the upper reaches of the subbasin and additional investments must also be made in collectors, but this subbasin is considered adequately served for the foreseeable future.

Even if other approaches are considered for meeting the needs of the study area as a whole, no plans should be made to change the strategies already in place for meeting the long-term needs of these four subbasins. Obviously, additional funding will be required in order to complete the plans now being implemented, but we recommend that no alterations be made to the strategies now under way in these subbasins.

Preparing Subbasins

Limited sanitary sewer service is now in place in the Hurricane Creek Subbasin. The Ringgold Interceptor, now in design, and funded in a partnership between the City of Ringgold and the ISS/MBWWTP, will include provisions for a major connection point in the future to serve this subbasin. In addition to these provisions, it is estimated that 34,437 linear feet in sanitary sewer interceptors will also be required, as well as a major pumping station at the connection point, and an extensive network of collectors.

Currently, the only sanitary sewer service available in the South Chickamauga Creek Subbasin is in the city of Ringgold and in limited surrounding areas. Plans are underway for the Ringgold Interceptor project, which will initially enable service to be provided to both here and in the Little Chickamauga Creek Subbasin and eventually facilitate future service for the East Chickamauga Creek and Tiger Creek subbasins. It is estimated that an additional 7,660 linear feet of sanitary interceptor sewers will be needed to serve the South Chickamauga Creek Subbasin, as well as the collectors to provide service throughout the Georgia portion of this subbasin. It is estimated that an additional 104,535 linear feet of sanitary interceptor sewers and collector system will be required to serve the Little Chickamauga Creek Subbasin.

Due to inadequate interceptor capacity, the Catoosa County portion of the West Chickamauga Creek Subbasin has limited sanitary sewer service available. Plans are under way for the construction of the West Chickamauga Creek Interceptor, which will enable sanitary sewer service to be provided throughout this subbasin. It is estimated that an additional 41,424 linear feet of sanitary interceptor sewers, including the West Chickamauga Creek Interceptor, will be needed to provide adequate, long-term service. An extensive collector system, including a proposed small pumping station and force main in the southern end of this subbasin, will also require funding.

The Walker County portion of the West Chickamauga Creek Subbasin, along with its companion Walker County areas of the Little Chickamauga Creek and Peavine Creek subbasins have very limited sanitary sewer service available. Plans call for extending sanitary interceptor sewers in three directions from the City of Chickamauga to provide service to points east and south of Rock Spring and Noble, to areas around Wallaceville and Chickamauga, and southwest to Kensington and beyond. It is estimated that 243,129 linear feet of sanitary interceptor sewer will be needed to serve the future demands of this mega-subbasin, not including an anticipated small pumping station and force main from Taqueta Falls on Lookout Mountain. Current plans call for all wastewater flows from these interceptors to be directed to the existing Chickamauga Wastewater Treatment Plant, which will be expanded in the future, as required. When flows to this facility exceed cost-effective treatment alternatives, plans are to abandon the facility and pump wastewater north through Dry Valley to the ISS in Chattanooga Valley for treatment at MBWWTP. Costs for this future system are not included in this report since it is anticipated that this need will not arise until after the end of the study period.

Currently, sanitary sewer service in the Lookout Creek Subbasin is only available in the vicinity of the city of Trenton. Construction is under way on a project that includes a gravity sanitary sewer line along S.R. 299 at I-24 Exit 169 in Dade County, along with a pump station and force main to connect to the ISS/MBWWTP. Future plans call for eventual expansion and extension of this system to serve the needs of the City of Trenton and surrounding areas as well as the farthest reaches of the Dade County portion of this subbasin as well as the small Dade County portions of the Chattanooga Creek Subbasin and limited other Dade County areas. It is estimated that 231,300 linear feet of sanitary interceptor sewers will be required to provide this service, not including the project now underway or a series of other pump stations and force mains. Collector system requirements are not included in this estimate.

Even if alternative approaches are considered for meeting the needs of the entire study area, steps should be taken to maximize the benefit of investments already made in these subbasins.

Unprepared Subbasins

If served by conventional means, it is estimated that 188,649 linear feet in sanitary interceptor sewers will be needed to provide service to the East Chickamauga Creek Subbasin, not including the extensive network of sanitary collector sewers that would be required to connect prospective customers to the system. These investments would address the existing and proposed needs as projected through the year 2025.

If served by conventional means, it is estimated that 174,520 linear feet in sanitary interceptor sewers will be needed to provide service to the Tiger Creek Subbasin, not including the extensive network of sanitary collector sewers that would be required to connect the prospective customer base to the system provided for them. These investments would address the existing and proposed needs as projected through the year 2025.

With the exception of limited sites of concentrated flows, it is not recommended that widespread sanitary sewer service be provided in the Sand Mountain areas of Dade County that do not naturally drain into the Tennessee River at Chattanooga. Where service is provided, it is recommended that pump station/force main systems convey the wastewater generated into the Lookout Creek Subbasin as improvements in service become available.

Assumptions

Several interceptor projects are under way within the study area. Each is at a different stage in the planning, design, and construction process. For purposes of this study, the following will be assumed:

1. The SR 299 interceptor, consisting of a gravity interceptor, a pump station and a force main into the ISS, now under construction in the Lookout Creek Subbasin, will be considered as an existing system.

2. The Ringgold Interceptor, consisting of a pump station and large-diameter force main to the ISS, now in design to serve the South Chickamauga Creek and Little Chickamauga Creek subbasins, will be considered as a future system proposed in this study and addressed simply as a special $3.5 million "pumping station" budget item.

3. The West Chickamauga Creek Interceptor, consisting of gravity interceptors, a pump station, and a force main into the ISS, now being planned to serve the Catoosa County part of the West Chickamauga Creek Subbasin, will also be considered as a future system.

Two unique situations exist that must also be addressed, one in Walker County and another in Dade County. It is recommended that Walker County agencies carefully evaluate the realistic prospects for any significant expansion of the Chickamauga Wastewater Treatment Plant. The regulatory hurdles needed for such an expansion, considering potential downstream impacts on Catoosa County, Chickamauga &

Chattanooga National Military Park, City of Fort Oglethorpe, City of East Ridge, and City of Chattanooga may be so great that major expansion becomes infeasible. If the existing Chickamauga WWTP can be permitted to expand from the current 3.5 MGD to a capacity of 6.5 MGD, it is likely that estimated wastewater flows from the projected year 2025 population could then be accommodated. Otherwise, plans should be made to abandon the Chickamauga Wastewater Treatment Plant and connect wastewater flows currently directed there to the ISS/MBWWTP. For purposes of this study, it will be assumed that the Chickamauga Wastewater Treatment Plant will be retained and expanded to accommodate proposed flows through the year 2025.

In mountaintop areas of Dade County, both on Lookout Mountain and Sand Mountain ("Other Dade County Areas"), it is recommended that development be limited to lower-density uses unless provided with measures to direct wastewater flows into an appropriately expanded Lookout Creek Subbasin sanitary sewer system.

Meetings with Local Public Officials

A series of meetings have been held in each of the counties that participated in funding this study. Agency representatives attending the meetings provided important information as well as direction for the planning process. Others who did not attend were contacted by phone and also provided input.

On Wednesday, May 28, 2003, the initial meeting was held in the Council Chambers of the Fort Oglethorpe City Hall for representatives from agencies in all three participating counties as well as the MBWWTP and Coosa Valley Regional Development Center. On Tuesday, July 29, 2003, a meeting of Walker County agency representatives was held in the conference room of the Walker County E 911 facility. On Wednesday, August 6, 2003, a meeting of Dade County agency representatives was held in the assembly room of the Dade County Administration Building. On Monday, August 18, 2003, a meeting of Catoosa County agency representatives was held in the first floor conference room of the Catoosa County Courthouse. Notes of these meetings are included in Appendix F.

Solicitation of Public Comment

Local community input has thus far been focused on maintaining communications with public agency representatives. No solicitation has yet been made for comments from the general public. At the time of presentation, a specific appeal will be made for input from citizens within the study area and others affected by development.

Project Costs

Estimated Construction Costs and Overall Project Costs

A preliminary estimate of total projected project costs associated with implementation of Alternative 3 has been prepared for use in this report.

The selected alternative involves providing sanitary interceptor sewer capacity to all study area subbasins adequate to receive anticipated wastewater flows from projected 2025 populations. In estimating the costs to provide this service, an attempt has been made to include all appropriate costs associated with a project (planning, mapping and field surveys, design and engineering, bidding, construction services, resident project representation, construction and installation costs, including materials, main line piping, manholes, tees, service lines, complete pumping facilities and etc. and contingencies). No costs have been included for sanitary collector sewer systems, only interceptors. Similarly, no costs have been included for improvements that may be needed to either the ISS or MBWWTP. The estimates included in this report reflect only project costs associated with gravity interceptor sewers, pump stations, and force mains. The total cost of such improvements for the study area is estimated to be almost $150 million. More detail on the basis for the cost estimates shown here can be found in Appendix E.

A summary of interceptor construction proposed for the study area is provided below, with subbasins categorized according to their current level of preparedness.

Prepared Subbasins

Since these four subbasins are already connected to the ISS/MBWWTP, relatively less work is needed to provide for their year 2025 wastewater capacity needs. The primary needs in these four subbasins would appear to be the continued extension of sanitary collector sewer systems throughout the intensively developed and developing areas of each basin not yet served and reducing I/I to optimize available capacity. It is estimated that completing the interceptor sewer program for these most prepared subbasins can be accomplished for no more than approximately $13 million.

Peavine Creek Subbasin –Since substantial infrastructure is already in place in this subbasin, the only improvements required for complete interceptor service is approximately 53,000 linear feet of small-diameter gravity interceptor construction at an estimated cost of $6 million.

Spring Creek Subbasin – As noted above, since the NWGI system has already been completed, no additional interceptor construction is proposed to serve the needs of this subbasin. The

NWGI also provides capacity for the anticipated wastewater flows from the Catoosa County portion of the West Chickamauga Creek Subbasin (addressed elsewhere) as well.

Dry Creek Subbasin - Since capacity is already in place to serve the needs of this subbasin, the only improvements required for complete interceptor service is a small pump station and force main to serve the portion of the Spring Creek Subbasin assigned to it and almost 25,000 linear feet of small-diameter interceptors at an estimated cost of approximately $2 million.

Chattanooga Creek Subbasin - Since capacity is already in place to serve the demands of this subbasin, the only improvements required for complete interceptor service is approximately 49,000 linear feet of small-diameter interceptors at an estimated cost of approximately $5 million.

Preparing Subbasins

Measures to provide for long-term growth have commenced in six of the remaining nine subbasins within the study area. These subbasins have been included in planning and design of new connections to the ISS, but substantial expenditures are needed in order to provide complete interceptor service throughout their developing areas. It is estimated that completing the interceptor program that has only just begun in these subbasins will cost a little over $94 million.

South Chickamauga Creek Subbasin - When construction is complete on the $3.5 million Ringgold Interceptor, it is proposed that the only additional interceptors needed to serve this subbasin are approximately 7,700 linear feet of 15-inch-diameter gravity interceptors at an estimated cost of approximately $1 million. Some small pump station and force main construction (not addressed in this report) may also be needed to serve the northern parts of this subbasin, which are currently only very sparsely developed.

Little Chickamauga Creek Subbasin - When construction of the Ringgold Interceptor has been completed, it is proposed that approximately 105,000 linear feet in large- and small-diameter gravity interceptors eventually be constructed to serve the needs of this subbasin at an estimated cost of approximately $14 million.

Hurricane Creek Subbasin - In order for significant sanitary sewer service to be provided in this subbasin, it is recommended that a new pump station be installed along the force main portion of the Ringgold Interceptor, now in design. This would facilitate service both here and in the northern parts of the South Chickamauga Creek Subbasin. It is anticipated that this pump station would cost approximately $500,000. Whenever this "target" becomes available, it is proposed that three additional small pump stations as well as approximately 34,500 linear feet in small-diameter gravity interceptors and force mains be constructed to serve this subbasin at an estimated cost of approximately $3.25 million.

West Chickamauga Creek Subbasin in Catoosa County - A facet of the NWGI is the provision of pump station and force main capacity to serve the wastewater transmission needs of the Catoosa County part of the West Chickamauga Creek Subbasin. To provide interceptor service throughout this subbasin, the West Chickamauga Creek Interceptor is proposed (and now in the planning stages), consisting of another pump station as well as approximately 74,500 linear feet in large- and small- diameter gravity interceptor and force main construction at an estimated cost of approximately $7.25 million.

West Chickamauga Creek Subbasin in Walker County – Based on plans to expand the existing Chickamauga WWTP (costs of which are not included here), in order to serve the Walker County parts of the Little Chickamauga Creek, Peavine Creek, and West Chickamauga Creek subbasins, three small pump stations and approximately 315,500 linear feet of large- and small-diameter gravity interceptors and force mains are proposed at an estimated cost of approximately $33.5 million.

Lookout Creek Subbasin – To serve the projected year 2025 wastewater needs of this subbasin and limited parts of the Other Dade County Areas, it is proposed that a large-capacity pump station be constructed in the future near the Tennessee-Georgia state line, with a force main connection into the ISS. To provide interceptor service throughout the remainder of the Dade County service area, a total of six smaller pump stations and approximately 351,500 linear feet in large- and small-diameter gravity interceptors and force mains are proposed at an estimated cost of approximately $35.25 million.

Unprepared Subbasins

The remaining three subbasins in the study area will need substantial investments to address the current needs for sanitary sewer service and to accommodate the long-term growth anticipated within each subbasin. It is estimated that interceptor service can be provided to the two appropriate subbasins here for just under $40 million.

East Chickamauga Creek Subbasin - In order to provide sanitary sewer service to the East Chickamauga Creek Subbasin, including the City of Tunnel Hill and other affected areas of Whitfield County, there must be an adequate target available in the Ringgold area for flows from this subbasin. When construction has been completed on the Ringgold Interceptor, it is proposed that approximately 188,500 linear feet in both large- and small-diameter gravity interceptors eventually be constructed at an estimated cost of approximately $24.25 million.

Tiger Creek Subbasin - For sanitary sewer service to be provided to the Tiger Creek Subbasin, the downstream portion of a future interceptor must first be constructed up East Chickamauga Creek to the mouth of Tiger Creek. When this has been done, it is proposed that approximately 174,520 linear feet in primarily small-diameter gravity interceptors be constructed to serve the Tiger Creek Subbasin at an estimated cost of approximately $18.25 million.

Other Dade County Subbasins – It is proposed that only limited parts of the Other Dade County Areas be served, and those parts through the Lookout Creek Subbasin, where a single Sand Mountain pump station and force main has already been included in Lookout Creek Subbasin figures.

Proposed Financing

The sanitary interceptor sewer construction proposed in this report totals $157.25 million. Financing for this amount will likely come from a variety of sources. It will require a number of creative approaches of all available funding sources in order for the ambitious agenda outlined here to be completed.

All four county governments represented within the study area have employed funding generated by the Special Purpose Local Option Sales Tax (SPLOST) in financing local capital projects. Renewed every 5 years and only by referendum, an average of less than $16 million per year in SPLOST funds will likely be generated over the course of the study period within the study area. Historically, SPLOST dollars have been used for a variety of purposes from fire and police equipment and road construction to stormwater improvements, recreational facilities, prison facilities, and community buildings. Politically speaking, it is doubtful that more than half of the total amount raised in area SPLOST referenda could be consistently devoted to sanitary sewer construction, most of which would likely be devoted to collector system expansion. If $4 million per year were generated using the SPLOST during the course of the study period (approximately 20 years), that would amount to only about half of the amount needed to fund interceptor construction proposed in this report. Obviously, additional sources will be required.

Revenue bonds are an appropriate source of funding for capital expansion in a sanitary sewer system. In order to employ this method of financing, a system must be able to demonstrate that its tap fees and user billing rates are adequate to generate a revenue surplus that would ensure repayment of any such bonds. The Georgia Environmental Facilities Authority (GEFA) has a series of low-interest loan programs available which feature a variety of long-term repayment periods up to 20 years. Low-interest GEFA loans should be considered as a prime source of funds.

The effective property tax rates of all county governments within the study area have historically been among the lowest in the state of Georgia. Representatives of all the participating governments report funding shortages and strained budgets. It is unlikely that direct general fund subsidies from any of these local county governments could be considered reliable revenue sources for the construction of sanitary sewer interceptors.

Similarly, the Local Option Sales Tax (LOST), used for funding general government services would be expected to be under such pressure that regular contributions from this source would seem unlikely.

Funding sources such as development impact fees, special service area taxing districts and higher user billing rates for remote areas should be explored as means to secure the funding necessary to construct interceptors in outlying areas. It would be reasonable to make financing structures available to private developers who would benefit from the extension of sanitary sewer service. Similar partnerships could be implemented with other local governmental agencies that would also benefit from expanded service. Use of creative financing arrangements with the ISS may be another way in which limited funds can be shared to facilitate a project benefiting more than one agency.

Community Development Block Grant (CDBG) funding will not be a likely source of capital for interceptors but may be more appropriate as a funding source for sanitary collector sewer system constructions in targeted parts of the study area.

Projected Operating Costs and User Charge Structure

Each of the agencies charged with providing sanitary sewer service in the study area has a different formula for calculating such things as tap fees, minimum monthly user billing fees and use demand charges. In the recommended alternative, all study area wastewater with the exception of certain Walker County areas would be directed to the ISS/MBWWTP. As a part of its authorization mandate to provide for its entire service area in an equitable manner, charges for wastewater treatment services are billed at the same rate to all regional user agencies, including the City of Chattanooga.

Regional ISS service charges are reviewed annually by all participating agencies and revised as necessary. The billing rate structure for wastewater flow into the regional ISS is divided into two parts: (1) operational and maintenance (O&M) expenses and (2) capital debt service. Current regional billing rates for metered wastewater flow are $.5393 per thousand gallons (O&M) plus $.2733 per thousand gallons (debt service), a total charge of $.8126 per thousand gallons. Over the next 20 years, it will be assumed that this rate will not rise faster than the consumer price index.

Environmental Impacts

Development of facilities to accommodate the activities of normal human society will almost always tend to cause environmental impacts. Such activities usually result in the consumption of clean water and the generation of contaminated water. Provision of a sanitary sewer system as proposed in the selected alternative poses the least risk for long-term environmental impact and is intended to facilitate development in a way that protects both public health and the natural ecological environment. In addition to the issue of sanitary sewage/wastewater, study area agencies will also need to address such issues as stormwater runoff, non-point water pollution sources, threats to air quality, and other general development impacts to the natural environment and quality of life.

Planning Area

While the study area for this report is completely in Georgia, its impacts are felt in a planning area that includes downstream areas of Tennessee. The study area comprises subbasins that drain north or west into the Tennessee River, most of which affect Hamilton County and the city of Chattanooga. Several also directly affect the city of East Ridge. As intensively developed urbanized areas, these Hamilton County and Chattanooga communities must be protected against the adverse impacts caused by increasing development within the study area. The interceptors that are proposed in this report will provide a network to convey wastewater into the ISS and protect the streams that flow from the study area into Hamilton County, Tennessee. See Exhibit 9.

Project Area

In addition to protecting the developed parts of Hamilton County, the most developed parts of the study area will also receive protection. The most urbanized and urbanizing areas in which most of the study area population currently resides are also immediately downstream from those areas expected to rapidly most develop in the coming decades. The same streams to be protected in Tennessee also need protection in their Georgia headwaters. As shown on Exhibit 9, the selected alternative isolates the wastewater generated in the study area from most of the stream courses found there. The project area for construction proposed in this report extends to most parts of the study area.

Impacts of Proposed Projects

The construction of these $157.5 million sanitary interceptor sewer systems as proposed in the selected alternative will affect most subbasins in the study area. Often, these projects will involve tributaries that cross jurisdictional boundaries. This will almost certainly require a level of coordinated effort between and among affected

agencies that has not been required in the past. Meeting the growth needs of the larger northwest Georgia regional area will require strategies that supercede local government service areas. As proposed in the selected alternative, all study area subbasins, except some Walker County areas, will be provided with interceptor systems that flow into Tennessee and connect to the ISS/MBWWTP. Since most of the study area subbasins are completely independent of one another, implementation of most of the projects proposed in this report may proceed at their own paces without adversely impacting projects in other subbasins.

Regional Wastewater Treatment Alliance

There are two regional wastewater authorities that have been established in the greater Chattanooga area to provide sanitary sewer service and conveyance and treatment of wastewater. Both of these (the ISS/MBWWTP and the Hamilton County Water and Wastewater Treatment Authority [HCW&WWTA]) are located in Tennessee. Both provide limited services in Georgia and are expected to continue for the foreseeable future. As required by the Georgia Service Delivery Strategy Act of 1997, each of the study area agencies have established jurisdictional agreements with other appropriate agencies to provide sanitary sewer service in a cost-effective manner with minimal gaps or overlapping services. The agreements and relationships created to facilitate service delivery have begun the process of increased collaboration. All parties involved in this study have expressed a desire to continue to better communication and cooperation in addressing common issues.

Beyond local county governments and those authorized at the county level to provide services, there is currently no regional Georgia organization or framework for either coordination of efforts or consolidation of services within the study area. While the Coosa Valley Regional Development Center provides administrative, planning, technical, and funding assistance for each of the Georgia agencies that participated in this study, their role has been limited thus far. In addition, discussions with representatives of participating agencies did not indicate any particular interest among those affected to create such a powerful umbrella agency or authority or to cede any significant local control to it, if it existed.

In addition, other changes over the past couple of decades have affected the ISS/MBWWTP and its relationship with regional user agencies. Whereas MBWWTP once hosted a large number of Tennessee regional user agencies and a relative few from Georgia (once only the City of Rossville and the WCW&SA), the situation has now become reversed. With the exception of City of Chattanooga, Town of Lookout Mountain, Tennessee, and City of Collegedale, all other regional user systems in

Hamilton County have been absorbed into the Hamilton County Water & Wastewater Treatment Authority. However, in Georgia, the ISS/MBWWTP finds itself with many regional user agencies: City of Rossville, WCW&SA, DCW&SA, City of Lookout Mountain, Georgia, City of Fort Oglethorpe, and City of Ringgold. The ISS/MBWWTP has gone on record in favor of a more coordinated and cooperative arrangement between and among all its regional users in general but among its growing list of northwest Georgia regional users, in particular.

In light of these circumstances, it is currently recommended that a "NorthWest Georgia Regional Wastewater Alliance" be created for the study area. It is further recommended that existing organizational tools be modified to better serve the changing needs of study area citizens. Agencies with adjacent jurisdictions should review any affected bilateral and multilateral agreements currently in place to improve service delivery. Service Delivery Strategy agreements should be commenced, reviewed, and revised as necessary based on findings of this study. Closer cooperation between Georgia agencies and the ISS/MBWWP and/or the HCWWTA, as appropriate, may be a way in which additional coordination of effort could also be implemented. Where existing sanitary sewer systems along the Tennessee-Georgia border could be used to provide improved cross-border service; jurisdictional issues should not serve as obstacles. Cost-effective service should be the goal of all affected agencies.

Since all of the affected agencies share the larger drainage basin affected by each other, there is a direct benefit for collaborative action. While a powerful "authority" may not be appropriate in this situation, other models are available that may be more suitable. The creation of a wastewater treatment "partnership" or "alliance" could provide enough of a structure for the agencies within the study area to cooperate and support one another in seeking funding for initiatives that provide economic development and simultaneously protect public health and the environment.

A two-state, five-county regional wastewater treatment consortium may provide a vehicle for addressing the issues in a larger, more appropriate context. Such an "alliance" would facilitate collaboration in addressing issues of mutual concern while not threatening the independence and autonomy of the locally-funded and controlled member agencies. All of these Georgia agencies have commenced unprecedented levels cooperation brought on by requirements of the Georgia Service Delivery Strategy Act. Agreements and contracts have resulted that have clarified territorial boundaries, responsibilities and relationships in ways that had never been done before. The current vision is merely for a broader, even more regional "service delivery

strategy" between and among multiple Georgia counties and the agencies within them as well as MBWWTP/ISS and even the Hamilton County W&WWTA.

At the December meeting of the study participants, there was consensus that the initiative to coordinate efforts should proceed and that CVRDC should, at least tentatively, act as the umbrella organization for this collaboration. Since the primary focus is on the public health and environmental protection needs of the three + county study area in Georgia, there does not appear to be a reason why CVRDC could not continue to lead, even if the proposed "alliance" were to include agencies outside the CVRDC territory or even those within Tennessee. It may be appropriate for the Tennessee agencies to plan their own separate "alliance" as an interim step. It would appear that the ultimate goal, as it regards the provision of wastewater treatment service, should be a seamless development region.

If all of the related water and wastewater issues could be addressed in a coordinated manner, it should result in the provision of more cost-effective service. The collaborative efforts of such an "alliance" would be more likely to attract state and federal funds than individual agencies acting independently of one another. The eventual make-up of this two-state (or even three-state) region could include three regional development centers (Southeast Tennessee Development District, North Georgia Regional Development Center and Coosa Valley Regional Development Center), five or more counties (Hamilton County in Tennessee and Catoosa, Dade, Walker and Whitfield counties in Georgia) and nine or more sanitary sewer utility districts, including Hamilton County Water & Wastewater Treatment Authority, Dalton Utilities (in the Tunnel Hill area), Ringgold, Fort Oglethorpe, Chickamauga, Rossville, Trenton, and Lookout Mountain, Georgia, Walker County W&SA, Dade County W&SA, Chattanooga and the MBWWTP/ISS (Collegedale and Lookout Mountain, Tennessee, may be prospects as well).

Benefits of the proposed alliance include the following:

- Locally elected agency officials would appoint members to serve on an alliance board
- The appointed board would prioritize interceptor projects and set affected usage rates
- If appropriate, the alliance could be empowered to sell revenue bonds for construction
- Agencies that did not join initially would be free to join at a later date
- Inter-state water quality issues could be addressed in a common forum

- Local agencies would continue to maintain control of all end users/customers
- The Alliance would concern itself primarily with "macro" issues and interceptors

Regional interceptor systems are already in place in several study-area subbasins. The Spring Creek Subbasin, Dry Creek Subbasin, and Chattanooga Creek Subbasin are situated well regarding capacity for long-term service needs. In addition, a number of study area agencies have limited prospects for sanitary sewer system expansion or have expressed no interest in expansion. These include Chickamauga, Rossville, Lookout Mountain, Georgia, and (eventually) Trenton. Among the agencies with jurisdiction over remaining subbasins and territories, representatives were asked to examine the proposed interceptor projects listed within their jurisdictions and identify those having the highest priority. The results of those analyses are as follows:

1. Within the Lookout Creek Subbasin, Dade County, DCW&SA, and Trenton share the same priority: a gravity interceptor to connect Trenton with the ISS/MBWWTP in order to facilitate the abandonment of the Trenton Wastewater Treatment Plant. Based on Exhibit E.1, the estimated cost of this proposed project is $12,579,126.

2. Within the Walker County portion of the West Chickamauga Creek Subbasin, Walker County and Walker County W&SA share the same priority: a gravity interceptor to connect Kensington to the Chickamauga Wastewater Treatment Plant, eliminating discharges into the West Chickamauga Creek upstream from Chickamauga and to provide expansion capacity to eventually serve developments in the McLemore Cove and Taqueta Falls areas. Based on Exhibit E.1, the estimated cost of this proposed project is $9,914,814.

3. Within the Catoosa County portion of the West Chickamauga Creek Subbasin, Catoosa County, Catoosa County Public Works Authority, and Fort Oglethorpe share the same priority: a gravity interceptor, pump station, and force main to serve the rapidly developing areas. This system will enable up to 12 current and proposed pumping stations to be abandoned as well as provide improved service and expansion capacity to serve this rapidly urbanizing area of dense population. Based on Exhibit E.1, the estimated cost of this proposed project is $7,451,377.

4. Within the East Chickamauga Creek Subbasin Catoosa County, Catoosa County Public Works Authority, Ringgold, Whitfield County, and Tunnel Hill share the same priority: a gravity interceptor to connect Tunnel Hill with the

proposed pump station now in design to be located beside I-75 in Ringgold, which will transport wastewater from this area to the ISS/MBWWTP. This interceptor will provide for the creation of a sanitary sewer system in Tunnel Hill and provide a measure of protection for the existing Ringgold Water Treatment Plant, which has a raw water intake on South Chickamauga Creek. Based on Exhibit E.1, the estimated cost for this proposed project is $8,804,704.

5. Catoosa County, Catoosa County Public Works Authority, Ringgold, and the Hamilton County Water & Wastewater Treatment Authority share the same priority within the small area between I-75 and Boynton Ridge, which drains naturally into the City of East Ridge, Tennessee. This area is experiencing rapid development and the required sanitary sewers could cost-effectively connect to the existing sanitary sewer system of the Hamilton County Water & Wastewater Treatment Authority. Based on Exhibit E.1, the estimated cost of this proposed project is $1,120,000.

The projects listed above would be completely within Georgia and would provide for expanded sanitary sewer service to the affected study area subbasins. Based on Exhibit E.1, it is estimated that these proposed projects combined would cost approximately $40 million.

In order to accommodate the wastewater flows anticipated from these first priority projects, upgrades would be needed in two primary interceptor systems located across the Tennessee state line in Chattanooga. No detailed analysis of capacities and cost has been prepared for the Tennessee portion of work. Figures shown are included primarily to determine order or magnitude. Further study of the requirements, alternatives, and total estimated costs of this work should precede funding decisions. At this point, it appears that the Tennessee portion of work to provide this improved level of service would cost approximately $15 million, as follows:

1. The South Chickamauga Creek Interceptor system would require a significant parallel interceptor system upgrade from Mackey Branch to the South Chickamauga Creek Pumping Station, a major upgrade of the Friar's Branch Pumping Station. The estimated cost of this proposed project is approximately $12 million.

2. The Lookout Creek Interceptor system would require construction of a new Wauhatchie Pump Station with a parallel force main to transport wastewater

from Dade County directly to MBWWTP. The estimated cost of this proposed project is approximately $3 million.

In addition to these initiatives, Hamilton County and the Hamilton County Water & Wastewater Treatment Authority have significant needs in southeastern Hamilton County, adjacent to the study area, which will require increased interceptor capacity to connect these growing areas to ISS/ MBWWTP. The estimated cost of the proposed projects necessary to provide the capacity to accommodate this growth is $5 million.

If a Northwest Georgia-Southeast Tennessee Regional Wastewater Treatment Alliance is formed, these projects would constitute the first priority interceptor projects needed to provide for the first phase of system implementation. In aggregate, the first priority projects necessary to provide for the service identified in this study (as well as limited affected, peripheral areas) have been estimated to cost approximately $60 million.

Funding

It is recommended that affected agencies continue to prioritize sanitary sewer interceptor and collector projects within their affected subbasins. When plans are made for future SPLOST referenda, the long-term infrastructure projects that are proposed in this report should be funded appropriately. If local resources become available from a general fund surplus, limited amounts should also be considered for targeted projects. The user billing rates of affected agencies should be reviewed and revised as necessary to provide an adequate surplus to service capital improvement debt. Planning should commence to use long-term, low-interest GEFA bonds as a means to finance the major expansions proposed in this report. Project-specific partnerships should also be explored with other local public agencies as well as with private developers to join in funding projects that provide joint benefits. If prospects exist for grant funding from state and federal sources, this should also be pursued by local agencies.

Benefits of Regional Approach

Generally speaking, a regional approach is recommended. Coordination of efforts is a means of minimizing effort and maximizing results. Since most subbasins in the study area for this report are independent, the benefits of collective action are not as great as they might otherwise be. The resources of the Coosa Valley Regional Development Center as well as the North Georgia Regional Development Center should be used in seeking state and federal funding available for projects proposed in this report.

Summary, Conclusions, and Recommendations

In the final analysis, the problems faced within this study area are much as they were outlined in the 1975 201 study. While population growth in the study area as a whole has not been dramatically different than projected in the original 201 study, it has occurred in different places than anticipated and future growth trends are now much better defined. Although much has been invested in public sanitary sewer system infrastructure within the study area over the past 25 years, these investments have not kept pace with rapid increases in demand. Growth projections demand immediate action. This study serves to recommend where action should be directed and what can be expected as a result.

Statement of the Problem

The population growth that has occurred in recent decades throughout the study area is projected to continue to increase into the foreseeable future. When projected out to the year 2025, these projected populations are expected to generate a predictable amount of wastewater. In many parts of the study area, inadequate preparations have been made to address this anticipated wastewater flow. The 12 discrete subbasins within the study area, as well as other areas of Dade County, have been categorized by level of preparedness and evaluated accordingly. From this information, three alternatives were considered to address wastewater treatment issues, in addition to a "no-action" alternative. These alternatives were compared regarding cost-effectiveness, environmental impacts, and feasibility, and a recommended alternative was selected based on these factors.

Summary of the Alternative Solutions Considered

Four subbasins of the study area are effectively prepared to address the projected 2025 growth and will not be substantially affected by the alternatives considered. Six of the subbasins are in the process of preparing to address the growing need and will be affected in minor ways. The various alternatives considered had their greatest impact on the two subbasins and the other areas of Dade County currently unprepared to address wastewater needs. The alternatives considered are similar in many respects but have significant differences in approach and strategy.

1. Encourage continued development of conventional sanitary sewer systems in all of the prepared and some of the preparing parts of the study area. Declare a development moratorium throughout all unprepared parts, as well as portions of the preparing parts where conventional systems may be least cost-effective.

2. Encourage continued development of conventional sanitary sewer systems in all of the prepared and some of the preparing parts of the study area. Promote use of decentralized on-site wastewater treatment systems in the unprepared subbasins as well as remote parts of the preparing subbasins of the study area.

3. Encourage planned, phased, conventional sanitary sewer system development to continue throughout all parts of the study area subbasins, whether prepared, preparing, or unprepared, to direct wastewater flows to the ISS/MBWWTP.

The no-action alternative involves reducing the pace of growth and sanitary sewer system expansion to which representatives of all local agencies have already expressed commitment. The most negative impact of this approach would be to the infrastructure investments that have already been made. With expenditures already made and future revenues committed through bonds based on a sanitary sewer service provision agenda, it is imperative that customers be connected for repayment of bonds. Unless customers are served and revenues collected, infrastructure investments already made become an unnecessary expenditure. Halting action in progress financially jeopardizes study area agencies and poses a threat to public health and the environment.

Recommended Solutions

It is recommended that a program of carefully planned and phased development of conventional sanitary sewer systems continue throughout all parts of the study area subbasins, whether prepared, preparing, or unprepared. With the possible exception of certain parts of Walker County, it is recommended that plans be made to direct all wastewater generated within the study area to the ISS/MBWWTP.

Implementation of realistic and far-sighted land use plans by the county governments represented in the study area should be considered foremost in setting the priorities for individual subbasin development. Appropriate agencies should develop a sequencing plan within each subbasin to maximize cost-effectiveness of proposed investments.

Plans should include identification of potential public and private sector partners and other funding sources for near-term projects. Coordinated efforts should be explored where possible. Sanitary sewer system tap fees, user rates, impact fees, and other measures for system revenue-generation should be evaluated in establishing a schedule for orderly system expansion. Where interceptor expansion is made, appropriate investments in collector systems should follow to enable services to actually be provided and revenues to be generated. SPLOST funds should be targeted to both interceptor and collector projects. Long-term, low-interest GEFA funding should be

used to facilitate methodical growth in system development. To supplement these investments, grant funding should also be sought from any and all available state and federal sources.