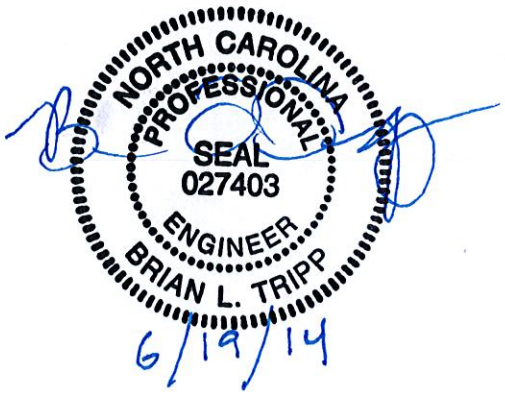
Rutherford County / Municipalities
Joint Sewer Study

Project No.: 20130158.00.CL
Issue Date: June 19, 2014

Client Information:

Rutherford County
289 N Main St
Rutherfordton, NC 28139



WK Dickson & Co., Inc.
616 Colonnade Drive
Charlotte, NC 28205
(704) 334-5348
www.wkdickson.com
charlotte@wkdickson.com
NC F-0374

Intentionally Left Blank

Table of Contents

Section	Page
Executive Summary	1
ES.1 – Project Purpose	1
ES.2 – Project Description	1
ES.3 – Project Scope	1
ES.4 – Findings	2
ES.5 – Recommendations	15
ES.6 – Obstacles	19
ES.7 – Conclusions	19
Section 1 – Introduction	1-1
1.1 – Project Description	1-1
1.2 – Definitions	1-1
1.3 – Project Scope	1-2
Section 2 – System Descriptions	2-1
2.1 – Cliffside Sanitary District	2-1
2.2 – Forest City	2-4
2.3 – Lake Lure	2-12
2.4 – Rutherfordton	2-13
2.5 – Spindale	2-15
2.6 – Findings	2-18
2.7 – Recommendations	2-18
Section 3 – Mapping / GIS	3-1
3.1 – Summary	3-1
3.2 – Background	3-1
3.3 – Benefits of a GIS Database	3-2
3.4 – Collecting Attribute Data Specific to each System Component	3-2
3.5 – Accurate and Up-to-Date Data	3-3
3.6 – Ease of Compliance with Accounting Regulations	3-3
3.7 – Sharing Data between the Towns and the County	3-4
3.8 – Findings	3-4
3.9 – Recommendations	3-5
Section 4 – Flow Analysis	4-1
4.1 – Summary	4-1
4.2 – Inflow and Infiltration	4-1
4.3 – Cliffside	4-6
4.4 – Forest City	4-7
4.5 – Lake Lure	4-9
4.6 – Rutherfordton	4-10
4.7 – Spindale	4-11
4.8 – System Inflow & Infiltration Summary	4-12

Table of Contents

4.9 – Findings 4-15
4.10 – Recommendations 4-15

Section 5 – Staffing and Operations 5-1

5.1 – Summary 5-1
5.2 – Cliffside 5-1
5.3 – Forest City 5-2
5.4 – Lake Lure 5-4
5.5 – Rutherfordton 5-6
5.6 – Spindale 5-7
5.7 – Regulatory Climate 5-10
5.8 – Staffing Assessment 5-14
5.9 – Findings 5-15
5.10 – Recommendations 5-15

Section 6 – Options for Consolidation 6-1

6.1 – Summary 6-1
6.2 – Potential Management Systems 6-1
6.3 – Findings 6-5
6.4 – Recommendations 6-9

Section 7 – Management System Considerations & Timeframes 7-1

7.1 – Summary 7-1
7.2 – Statutory Procedures 7-2
7.3 – Organizational Mechanism 7-2
7.4 – Time Considerations / Time Line 7-2

Section 8 – Physical Condition Analysis 8-1

8.1 – Summary 8-1
8.2 – Asset Management Plans and Capital Improvement Plans 8-1
8.3 – Physical Condition of Sewer Collection Systems 8-2
8.4 – Physical Condition of Treatment Plants 8-4
8.5 – Findings 8-11
8.6 – Recommendations 8-12

Section 9 – County Domestic Sewer Service Analysis 9-1

9.1 – Summary 9-1
9.2 – Opinions of Probable Cost 9-2

Section 10 – Economic Development Sewer Service Analysis 10-1

10.1 – Summary 10-1
10.2 – Opinions of Probable Cost 10-2

Table of Contents

Section 11 – Financial Analysis 11-1

11.1 – Summary 11-1
11.2 – Financial Information 11-1
11.3 – Rate Structures 11-4
11.4 – Opinions of Probable Cost 11-8
11.5 – Financial Model 11-10
11.6 – Legislative Actions & Issues 11-16
11.7 – Findings 11-17
11.8 – Recommendations 11-18

Section 12 – Case Studies 12-1

12.1 – Summary 12-1
12.2 – Yadkin Valley Sewer Authority 12-1
12.3 – Westpoint-Stevens / Scotland Co. / Lumbar River COG 12-2
12.4 – Water and Sewer Authority of Cabarrus County 12-3
12.5 – Cape Fear Public Utility Authority 12-4

Section 13 – References 13-1

Table of Contents

Tables **Page**

Table ES-1	Sewer Rate Comparison for a 5,000 gallon per month Residential Customer	6
Table ES-2	County / Joint Municipalities Opinions of Probable Cost	6
Table ES-3	Other Rutherford County Opinions of Probable Cost	7
Table ES.4	Infiltration Parameter Check	7
Table ES.5	Inflow Calculation	7
Table ES.6	Capacities of Project Stakeholders WWTPs	7
Table ES.7	Rutherford County Domestic Sewer Service Analysis Opinions of Probable Costs	9
Table ES.8	Rutherford County Economic Development Sewer Service Analysis Opinions of Probable Costs	9
Table 2-1	Cliffside Collection System Line Descriptions	2-1
Table 2-2	Forest City Second Broad River Collection System Line Descriptions	2-4
Table 2-3	Forest City Pump Station Details	2-6
Table 2-4	Spindale Pump Station Details	2-15
Table 3-1	GIS Data Received from the Project Stakeholders	3-2
Table 4-1	Cliffside WWTP Effluent Flow Data	4-7
Table 4-2	Forest City Second Broad River WWTP Effluent Flow Data	4-8
Table 4-3	Forest City I&I Study Results for Brackett Creek, Erwin, Woodburn, and Dogwood Pump Station Sewer Basins	4-8
Table 4-4	Lake Lure WWTP Effluent Flow Data	4-9
Table 4-5	Rutherfordton WWTP Effluent Flow Data	4-11
Table 4-6	Spindale WWTP Effluent Flow Data	4-11
Table 4-7	Criteria for Non-Excessive Infiltration Determination	4-13
Table 4-8	Infiltration Estimates	4-13
Table 4-9	Infiltration Parameter Check	4-14
Table 4-10	Inflow Calculations	4-14
Table 4-11	Capacities of Project Stakeholders WWTP's	4-15
Table 5-1	Recommended Collection System Staffing	5-14
Table 5-2	Recommended WWTP Staffing	5-14
Table 7-1	Management System Time Frame	7-3
Table 8-1	Town of Forest City Permit Violations for 2011 and 2012	8-5
Table 9-1	Rutherford County Domestic Sewer Service Analysis Opinions of Probable Costs	9-2
Table 10.1	Rutherford County Economic Development Sewer Service Analysis Opinions of Probable Costs	10-2
Table 11.1	Cliffside Sanitary District Sewer Rates	11-4
Table 11.2	Forest City Sewer Rates	11-4
Table 11.3	Lake Lure Sewer Rates	11-5
Table 11.4	Rutherfordton Sewer Rates	11-5
Table 11.5	Spindale Sewer Rates	11-5
Table 11.6	Sewer Rate Comparison for a 5,000 gallon per month Residential Customer	11-7
Table 11.7	County / Joint Municipalities Opinions of Probable Cost	11-9
Table 11.8	Other Rutherford County Opinions of Probable Cost	11-10

Table of Contents

Figures		Page
Figure 4-1	Forest City WWTP Effluent Flow Data versus Rainfall	4-9
Figure 11-1	Consolidation of Lake Lure, Rutherfordton and Spindale – Total Revenue & Expenses and Debt Service Coverage Ratio	11-12
Figure 11-2	Consolidation of Lake Lure, Rutherfordton and Spindale – Total Revenue & Expenses and Rate per 5,000 Gallons	11-13
Figure 11-3	Consolidation of Cliffside, Lake Lure, Rutherfordton and Spindale with Forest City – Total Revenue & Expenses and Debt Service Coverage Ratio	11-14
Figure 11-4	Consolidation of Cliffside, Lake Lure, Rutherfordton and Spindale with Forest City – Total Revenue & Expenses and Rates per 5,000 Gallons	11-14
Figure 11-5	Consolidation of Cliffside with Forest City – Total Revenue & Expenses and Debt Service Coverage Ratio	11-15
Figure 11-6	Consolidation of Cliffside with Forest City – Total Revenue & Expenses and Rates per 5,000 Gallons	11-16

Table of Contents

Appendices

Appendix 2.1 – Project Stakeholders NPDES Permit Summary
Appendix 3.1 – Composite GIS Map
Appendix 5.1 –Staff Complements for Wastewater Collection System Maintenance based on Population Size
Appendix 5.2 – Recommended Collection System Staffing
Appendix 5.3 – Recommended Treatment Staffing
Appendix 6.1 – Characteristics of State Authorized Institutional Arrangements for the Provision of Water and/or Wastewater Service in North Carolina
Appendix 9.1 – Domestic Sewer System Analysis Opinions of Probable Costs
Appendix 10.1 – Rutherford County Economic Development Sewer Service Analysis Opinions of Probable Costs
Appendix 11.1 – Cliffside Sanitary District Sewer Rates
Appendix 11.2 – Cliffside Sanitary District Financial Information
Appendix 11.3 – Cliffside Sanitary District 2012 / 2013 Sewer Usage Data
Appendix 11.4 – Forest City Sewer Rates
Appendix 11.5 – Forest City Financial Information
Appendix 11.6 – Forest City 2012 / 2013 Sewer Usage Data
Appendix 11.7 – Lake Lure Sewer Rates
Appendix 11.8 – Lake Lure Financial Information
Appendix 11.9 – Lake Lure 2012 / 2013 Sewer Usage Data
Appendix 11.10 – Rutherfordton Sewer Rates
Appendix 11.11 – Rutherfordton Financial Information
Appendix 11.12 – Rutherfordton 2012 / 2013 Sewer Usage Data
Appendix 11.13 – Spindale Sewer Rates
Appendix 11.14 – Spindale Financial Information
Appendix 11.15 – Spindale 2012 / 2013 Sewer Usage Data
Appendix 11.16 – Lake Lure to Rutherfordton WWTP Opinion of Probable Cost
Appendix 11.17 – Cost to Upgrade Lake Lure WWTP Opinion of Probable Cost
Appendix 11.18 – Rutherfordton WWTP Upgrades to Handle Lake Lure & Equestrian Center Opinion of Probable Cost
Appendix 11.19 – Rutherfordton to Spindale WWTP Opinion of Probable Cost
Appendix 11.20 – Upgrades to Spindale WWTP to Handle Rutherfordton & Lake Lure Opinion of Probable Cost
Appendix 10.21 – Spindale to Rutherfordton WWTP Opinion of Probable Cost
Appendix 10.22 – Spindale to Forest City Second Broad River WWTP Opinion of Probable Cost
Appendix 11.23 – Spindale and Rutherfordton to Forest City WWTP Opinion of Probable Cost
Appendix 11.24 – Cliffside to Forest City Second Broad River WWTP Opinion of Probable Cost
Appendix 11.25 – Cliffside to Riverstone WWTP Opinion of Probable Cost
Appendix 11.26 – Cliffside to Forest City DRG WWTP w/o Riverstone WWTP Opinion of Probable Cost
Appendix 11.27 – Cliffside to Forest City DRG WWTP with Riverstone WWTP Opinion of Probable Cost
Appendix 11.28 – Forest City Second Broad River WWTP Upgrades to Handle Cliffside, Rutherfordton, and Spindale WWTP Opinion of Probable Cost
Appendix 11.29 – Upgrades to Forest City Riverstone WWTP to Handle Cliffside Opinion of Probable Cost
Appendix 11.30 – Upgrades to Forest City DRG WWTP to Handle Cliffside and Riverstone Opinion of Probable Cost

Appendix 11.31 – Rutherford County Airport to Spindale Opinion of Probable Cost
Appendix 11.32 – Area North of Rutherfordton / Hwy 221 to Rutherfordton Opinion of Probable Cost
Appendix 11.33 – Sewer Service to Ellenboro Henrietta Rd Interchange at Hwy 74 via FM to Ellenboro Opinion of Probable Cost
Appendix 11.34 – Sewer Service to Ellenboro Henrietta Rd Interchange at Hwy 74 via FM to Henrietta Opinion of Probable Cost
Appendix 11.35 – Service to Industrial Area on HWY 221 near Harris Elementary via PS & FM to Spindale Torrington PS on Hwy 221 Opinion of Probable Cost
Appendix 11.36 – Service to Industrial Area on Hwy 221 near Harris Elementary via PS & FM to Forest City Riverstone WWTP
Appendix 11.37 – Hwy. 221 / US 74 Interchange PS Upgrade – Spindale Opinion of Probable Cost
Appendix 11.38 – Forest City Central Business District Sewer Rehab (Post Bid) Opinion of Probable Cost
Appendix 11.39 – Forest City Mill Street Area Sewer Rehabilitation Opinion of Probable Cost
Appendix 11.40 – Forest City WWTP Large Aeration Basin & Digester Improvements Opinion of Probable Cost
Appendix 11.41 – Spindale – Rehabilitation of Trunk Line A3 Opinion of Probable Cost
Appendix 11.42 – Spindale – Rehabilitation of Trunk Line A2 Opinion of Probable Cost
Appendix 11.43 – Spindale – Rehabilitation of Oak Street PS – Southern Trunk Line Opinion of Probable Cost
Appendix 11.44 – Spindale – Rehabilitation of Oak Street PS – Southern Trunk Line Opinion of Probable Cost
Appendix 11.45 – Rutherfordton – Sewer Outfall to the Second Broad River Opinion of Probable Cost
Appendix 11.46 – Sewer Operation & Maintenance Programs Opinion of Probable Cost
Appendix 11.47 – Cliffside Continuing Sewer Assessment / Sanitary Sewer Evaluation Study Opinion of Probable Cost
Appendix 11.48 – Forest City Continuing Sewer Assessment / Sanitary Sewer Evaluation Study Opinion of Probable Cost
Appendix 11.49 – Lake Lure Continuing Sewer Assessment / Sanitary Sewer Evaluation Study Opinion of Probable Cost
Appendix 11.50 – Rutherfordton Continuing Sewer Assessment / Sanitary Sewer Evaluation Study Opinion of Probable Cost
Appendix 11.51 – Spindale Continuing Sewer Assessment / Sanitary Sewer Evaluation Study Opinion of Probable Cost
Appendix 11.52 – Upgrading the Rutherfordton WWTP from 3 MGD to 6 MGD Opinion of Probable Costs
Appendix 11.53 – Table A.11.1 – Revenues & Expenses - All Project Stakeholders
Appendix 11.54 – Table A.11.2 – Revenue Projections - Consolidation of Lake Lure, Rutherfordton & Spindale
Appendix 11.55 – Table A.11.3 – Capital Improvements & Net Income - Consolidation of Lake Lure, Rutherfordton & Spindale
Appendix 11.56 – Table A.11.4 – Revenue Projections - Consolidation of Cliffside Sanitary District, Lake Lure, Rutherfordton, and Spindale with Forest City
Appendix 11.57 – Table A.11.5 – Capital Improvements & Net Income - Consolidation of Cliffside Sanitary District, Lake Lure, Rutherfordton, and Spindale with Forest City
Appendix 11.58 – Table A.11.6 – Revenue Projections - Consolidation of Cliffside Sanitary District with Forest City
Appendix 11.59 – Table A.11.7 – Capital Improvements & Net Income - Consolidation of Cliffside

Sanitary District with Forest City
Appendix 11.60 – Figure 11-1 – Consolidation of Lake Lure, Rutherfordton and Spindale – Total Revenue & Expenses and Debt Service Coverage Ratio
Appendix 11.61 – Figure 11-2 – Consolidation of Lake Lure, Rutherfordton and Spindale – Total Revenue & Expenses and Rate per 5,000 Gallons
Appendix 11.62 – Figure 11-3 – Consolidation of Cliffside, Lake Lure, Rutherfordton and Spindale with Forest City – Total Revenue & Expenses and Debt Service Coverage Ratio
Appendix 11.63 – Figure 11-4 – Consolidation of Cliffside, Lake Lure, Rutherfordton and Spindale with Forest City – Total Revenue & Expenses and Rates per 5,000 Gallons
Appendix 11.64 – Figure 11-5 – Consolidation of Cliffside with Forest City – Total Revenue & Expenses and Debt Service Coverage Ratio
Appendix 11.65 – Figure 11-6 – Consolidation of Cliffside with Forest City – Total Revenue & Expenses and Rates per 5,000 Gallons

Executive Summary

ES.1 Project Purpose:

Rutherford County, the Town of Forest City, the Town of Lake Lure, the Town of Spindale, and the Town of Rutherfordton have elected to evaluate the best long term strategies for providing sewer service within the County and Towns.

ES.2 Project Description:

This project involved providing Professional Engineering Services for the Rutherford County / Municipalities Joint Sewer Study for Rutherford County, North Carolina**.** Rutherford County (Owner) has eight (8) Towns within its boundaries. The Town of Lake Lure, the Town of Spindale and the Town of Rutherfordton own and operate one (1) Wastewater Treatment Plant (WWTP) each. The Town of Forest City owns and operates two (2) WWTPs (and owns an additional WWTP not currently in operation that was formerly owned by an industry). The Town of Ellenboro has a sanitary collection system that pumps to the Town of Forest City's collection system and WWTP for treatment. In addition, the Cliffside Sanitary District also owns and operates its own WWTP and collection system.

The dramatic reduction in the textile industry that occurred in Rutherford County, beginning in the 1990's and continuing until the last few years, has resulted in a dramatic reduction in sewer flows to the various WWTP's. Many of the WWTP's need extensive upgrades to meet current treatment requirements. And, many of the Town's wastewater collection systems are plagued by Infiltration and Inflow (I&I).

ES.3 Project Scope:

The project included the following tasks:

a. The compilation of a composite GIS map of the Project Stakeholders sewer systems including sewer lines, force mains, pump stations and WWTP based on GIS data provided by the Project Stakeholders.
b. The development of a summary of average daily flows, peak daily flows and peak hour flows for each sewer collection system based on data provided by the Project Stakeholders.
c. The development of a reasonable assessment of the volume of Inflow & Infiltration in each Project Stakeholder's collection system.
d. An evaluation of the consolidation of sewer collection and treatment systems, including the abandonment of inefficient WWTP's for and between the Project Stakeholders along with opinions of probable cost.
e. An evaluation of the consolidation of collection system operations making use of shared resources that included the identification of practical management systems for the consolidation of the various sewer collection systems while taking into consideration current and proposed legislation regarding utility management systems.
f. An analysis of areas within the County needing domestic sewer service.
g. An analysis of areas within the County needing sewer service for economic development.

h. Building a utility financial model for proposed projects to determine and demonstrate the financial feasibility of consolidation and to show multiyear cash flows as municipal systems are interconnected in phases and provide the likely impacts on sewer rates.

ES.4 Findings:

Options for Consolidation

After reviewing the viable options for consolidation as well as discussion with Project Stakeholders staff and elected officials, the following observations were noted:

a. Ownership of the sewer systems should be run responsibly.
b. Operational structures, policy and practices should remain sensitive to the specific needs of the geographic areas that are served by the selected management system.
c. A new management system should be able to provide administrative and management functions more efficiently and economically by a single organizational entity due to economies of scale.
d. Economies of scale should result in lower long term unit costs for operation and maintenance.
e. The individual Project Stakeholders may not be able to capitalize substantial investments in new system capacity or new service infrastructure on their own.
f. New economic growth could be stunted by the Project Stakeholders inability to respond to new demands beyond their existing service limits.
g. Financing mechanisms available to a new management entity should be flexible and should approximate those available to municipal and county government in North Carolina.
h. Improved planning and more effective investment of capital into the County's sewer systems should lead to improved sewer system reliability; and,
i. Both Spindale and Lake Lure are experiencing compliance issues associated with meeting their NPDES permit limits.

In light of the findings and conclusions, the list of viable alternatives was reduced to the following:

a. Inter-Local Contracts or Inter-Governmental Agreements (IGA)
b. Joint Management Agency (JMA)
c. Sewer Authority
d. Sanitary District
e. County Sewer District

A summary of the primary aspects and differences of the alternatives are listed below.

a. An IGA is different than a JMA in that a JMA requires action by each participating unit on items / expenditures in order to move forward.
b. An IGA is applicable in situations where the other prescribed intergovernmental mechanisms do not exactly apply to the situation and where complexities are too great to deal with within the confines of the statutes for other organizational alternatives.
c. IGAs and JMAs are typically viewed as an interim step to some other form of management entity.

d. An IGA and a JMA are different than a Sewer Authority, Sanitary District, and a County Sewer District in that Legal title to real property must remain or rest with the participating governments or government, or property may be held jointly as tenants in common.
e. A JMA cannot issue revenue bonds or general obligation bonds, establish its rates & charges, or levy property taxes or special assessments.
f. The Authority alternative is the best-known vehicle among the entities that are considered viable options to independent municipal systems.
g. An Authority is an independent public body with a governing board; the number of board members elected is left to the discretion of the respective local governments and membership is appointed by the governmental units that organized it.
h. Authorities have the power to set and collect fees for service and to issue revenue bonds.
i. Except for the appointment of membership, Authorities stand alone and its powers are governed by statute and only limited by its charter of incorporation.
j. A Sanitary District or a County Sewer District do possess the power to levy property taxes or special assessments whereas an Authority does not.
k. A Sanitary District becomes an independent, corporate political body, and the county commissioners elect a sanitary district board to serve as the district's governing body.
l. In order for a Sanitary District to be created, 51 percent or more of the property owners within the proposed district must petition the board of commissioners in the county that contains the largest portion of the district's land area.
m. A County Sewer District is a corporate political body, governed by the board of commissioners of the county in which the district is established.
n. The fact that Broad River Water Authority is already in existence is seen as a vehicle for creating a new sewer management entity.

Financial Analysis

As part of the project, a comparison of the Project Stakeholders rates was conducted. Below in Table ES.1 please find a sewer rate comparison amongst the project stakeholders.

Table ES.1 Sewer Rate Comparison for a 5,000 gallon per month Residential Customer

Stakeholder		Base	Per 1,000	3,000	5,000	10,000
Cliffside		$26.00	$5.05	$36.10	$46.20	$71.45
Lake Lure	Inside	$21.00	$3.68	$32.04	$39.40	$57.80
	Outside	$42.00	$7.35	$64.05	$78.75	$115.50
Forest City	Inside	$14.95	$3.71	$14.95	$22.37	$40.92
	Outside	$27.15	$6.97	$27.15	$41.09	$75.94
Rutherfordton	Inside	$12.09	$4.70	$21.49	$30.89	$54.39
	Outside	$36.27	$14.11	$64.49	$92.71	$163.26
Spindale	Inside	$16.00	$5.69	$27.38	$38.76	$67.21
	Outside	$32.00	$11.38	$54.76	$77.52	$134.42
Average				$38.05	$51.97	$86.77
Average Inside				$26.39	$35.52	$58.35
Average Outside				$52.61	$72.52	$122.28

Various capital projects were identified should consolidation occur. As a result, opinions of probable costs for the various options are presented below in Table ES.2.

Table ES.2 County / Joint Municipalities Opinions of Probable Cost

	Alternative	Probable Cost
A.	Lake Lure to Rutherfordton WWTP	$9,901,000
B.	Cost to Upgrade Lake Lure WWTP	$7,014,000
C.	Rutherfordton WWTP Upgrades to Handle Lake Lure & Equestrian Center	$304,000
D.	Rutherfordton to Spindale WWTP	$5,171,000
E.	Upgrades to Spindale WWTP to Handle Rutherfordton & Lake Lure	$11,205,000
F.	Spindale to Rutherfordton WWTP	$8,292,000
G.	Spindale to Forest City Second Broad River WWTP	$5,628,000
H.	Spindale and Rutherfordton to Forest City WWTP	$8,294,000
I.	Cliffside to Forest City Second Broad River WWTP	$5,423,000
J.	Cliffside to Riverstone WWTP	$4,799,000
K.	Cliffside to Forest City DRG WWTP w/o Riverstone WWTP	$6,226,000
L.	Cliffside to Forest City DRG WWTP with Riverstone WWTP	$6,509,000
M.	Forest City Second Broad River WWTP Upgrades to Handle Cliffside, Rutherfordton, and Spindale WWTP	$8,585,000
N.	Upgrades to Forest City Riverstone WWTP to Handle Cliffside	$889,000
O.	Upgrades to Forest City DRG WWTP to Handle Cliffside and Riverstone	$1,348,000
P.	Rutherford County Airport to Spindale	$1,551,000
Q.	Area North of Rutherfordton / Hwy 221 to Rutherfordton	$1,551,000
R.	Sewer Service to Ellenboro Henrietta Rd Interchange at Hwy 74 via FM to Ellenboro	$2,231,000
S.	Sewer Service to Ellenboro Henrietta Rd Interchange at Hwy 74 via FM to Henrietta	$1,979,000
T.	Service to Industrial Area on HWY 221 near Harris Elementary via PS & FM to Spindale Torrington PS on Hwy 221	$1,914,000
U.	Service to Industrial Area on Hwy 221 near Harris Elementary via PS & FM to Riverstone Blvd Gravity Sewer to Riverstone WWTP	$2,145,000
V.	Hwy. 221 / US 74 Interchange PS Upgrade – Spindale	$150,000

It should be noted that these Opinions of Probable Cost should be considered planning estimates only. Should the project stakeholders elect to proceed with a scenario that uses an alternative or alternatives, it is recommended that a detailed opinion of probable construction costs and life cycle analysis be conducted on the alternative(s) in the form of a Preliminary Engineering Report (PER).

In addition, other capital needs were identified by WK Dickson and in individual reports supplied to WK Dickson by the project stakeholders and prepared by the project stakeholders consulting engineers as referenced in the reference section of this study. As a result, Table ES.3 as presented on the next page has been prepared.

Table ES.3 Other Rutherford County Opinions of Probable Cost

	Additional Capital Needs	Probable Cost
A.	Forest City Central Business District Sewer Rehab (Post Bid)	$944,197
B.	Forest City Mill Street Area Sewer Rehabilitation	$928,000
C.	Forest City WWTP Large Aeration Basin & Digester Improvements	$1,711,000
D.	Spindale – Rehabilitation of Trunk Line A3	$968,000
E.	Spindale – Rehabilitation of Trunk Line A2	$1,449,000
F.	Spindale – Rehabilitation of Oak Street PS – Southern Trunk Line	$641,000
G.	Spindale – Rehabilitation of Oak Street PS – Northern Trunk Line	$410,000
H.	Rutherfordton – Sewer Outfall to the Second Broad River	$8,003,000
I.	Cliffside to Forest City Second Broad River WWTP	$5,423,000
J.	Sewer Operation & Maintenance Programs	$200,000
K.	Cliffside Continuing Sewer Assessment / Sanitary Sewer Evaluation Study	$262,000
L.	Forest City Continuing Sewer Assessment / Sanitary Sewer Evaluation Study	$435,000
M.	Lake Lure Continuing Sewer Assessment / Sanitary Sewer Evaluation Study	$452,000
N.	Rutherfordton Continuing Sewer Assessment / Sanitary Sewer Evaluation Study	$379,000
O.	Spindale Continuing Sewer Assessment / Sanitary Sewer Evaluation Study	$364,000
P.	Upgrading the Rutherfordton WWTP from 3 MGD to 6 MGD	$15,000,000

After reviewing the limited financial analysis conducted for the Project Stakeholders as well as interviewing their respective staff's, the following observations were noted:

a. All project stakeholders assume that the full cost of service is currently being charged to their rate payers.
b. A more regionalized approach will benefit rate paying customers through operations and maintenance efficiencies and economies of scale that can be recognized through the shared use of labor, equipment, purchasing agreements, and capital resources.
c. These savings and efficiencies can be passed on to the ratepayer in the form of reduced rates, or the provision of greater rate stability.
d. Cliffside Sanitary District, Forest City, and Rutherfordton have declining rate block structures.
e. Spindale has a flat rate structure.
f. Lake Lure has an inclining rate block structure.
g. Rutherfordton's outside rates are over double the inside rates.
h. Forest City's outside rates are less than double the inside rates.
i. Lake Lure's and Spindale's outside rates are approximately double the inside rates.
j. Rutherfordton currently maintains minimal reserves.
k. Rutherfordton has not adjusted rates in accordance with their 2011 Financial Model.
l. It is assumed this means Rutherfordton has not kept up with the capital improvements planned in the CIP contained in the Financial Model.
m. Decreasing rate block structures are not looked upon favorably by loan and grant agencies.
n. Outside rates that are significantly higher than inside rates are not looked upon favorably by loan and grant agencies as well as the legislature.
o. The cost to upgrade the Rutherfordton WWTP and transfer wastewater flow from Spindale to Rutherfordton is $8,292,000 + $15,000,000 = $23,292,000.
p. The cost to upgrade the Spindale WWTP and transfer flow from Rutherfordton to Spindale $5,171,000 + $11,205,000 = $16,376,000.

q. The cost to upgrade the Forest City WWTP and transfer wastewater flow from Spindale and Rutherfordton to Forest City is $8,294,000 + $5,171,000 + $8,585,000 = $22,050,000.

r. In order to make consolidation viable, capital costs for the projects need to be offset with a combination of grants and/or low interest loans and additional forms of financing such as Tax Increment Financing Districts.

s. If Lake Lure upgrades their WWTP on their own without any financial assistance at an estimated project cost of $7,014,000 and an interest rate of 3%, it has been estimated that Lake Lure would have to raise rates 100%.

t. If Lake Lure connects to Rutherfordton for wastewater treatment on their own without any financial assistance at an estimated project cost of $9,901,000 and an interest rate of 3%, it has been estimated that Lake Lure would have to raise rates 140%.

u. If Spindale upgrades their WWTP on their own without any financial assistance at an estimated project cost of $4,000,000 ($1,000,000 grant already secured) and an interest rate of 3%, it has been estimated that Spindale would have to raise rates 30%.

v. If Spindale upgrades their WWTP on their own without any financial assistance at an estimated project cost of $5,000,000 and an interest rate of 3%, it has been estimated that Spindale would have to raise rates 35%.

w. If Spindale upgrades their WWTP on their own without any financial assistance at an estimated project cost of $11,200,000 and an interest rate of 3%, it has been estimated that Spindale would have to raise rates 80%.

x. Assuming a conservative 20% savings in overall operating and management costs, 2% increases in operating and management costs per year, a 3% interest rate, and conversion to a flat rate structure, three financial model scenarios were developed:
   i. Scenario 1 - Consolidating Lake Lure, Rutherfordton and Spindale;
   ii. Scenario 2 - Consolidating Cliffside with Forest City; and,
   iii. Scenario 3 - Consolidating Cliffside, Lake Lure, Rutherfordton and Spindale with Forest City.

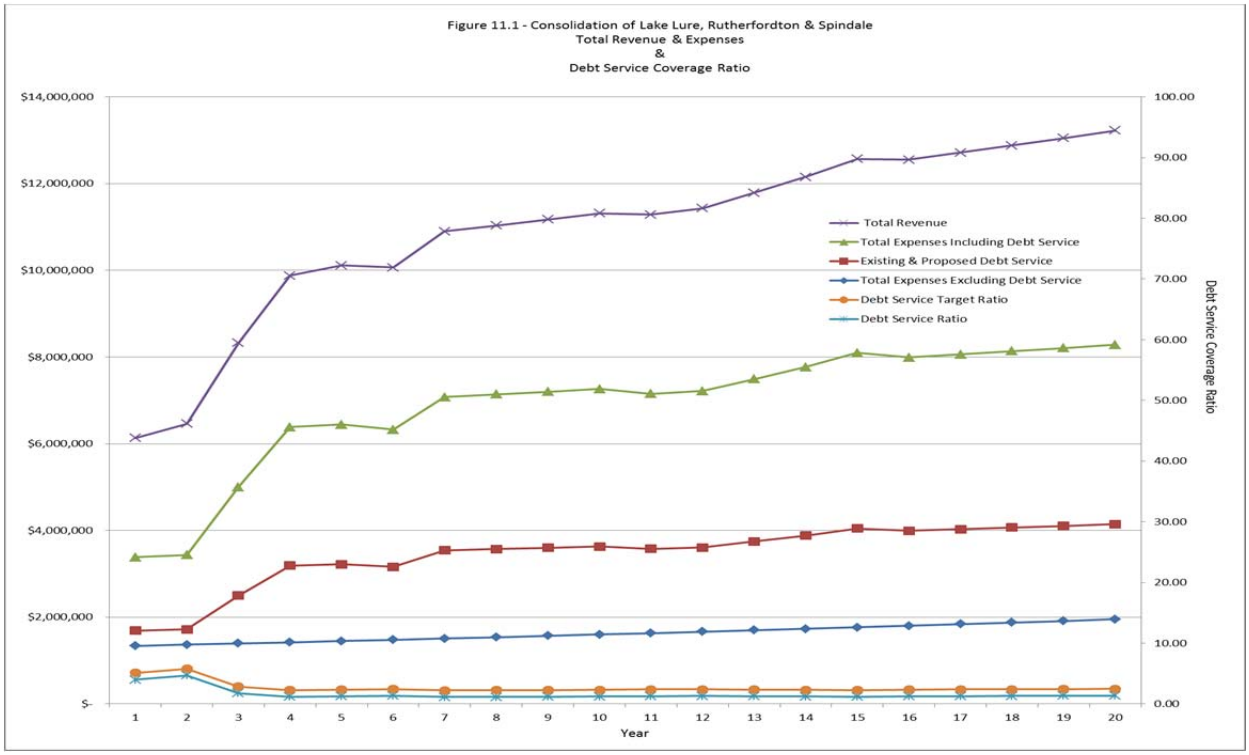
y. The three financial model scenarios have been compiled to include the necessary capital projects to show a potential time line for rate increases and the capital projects as well as the projected rate increases.

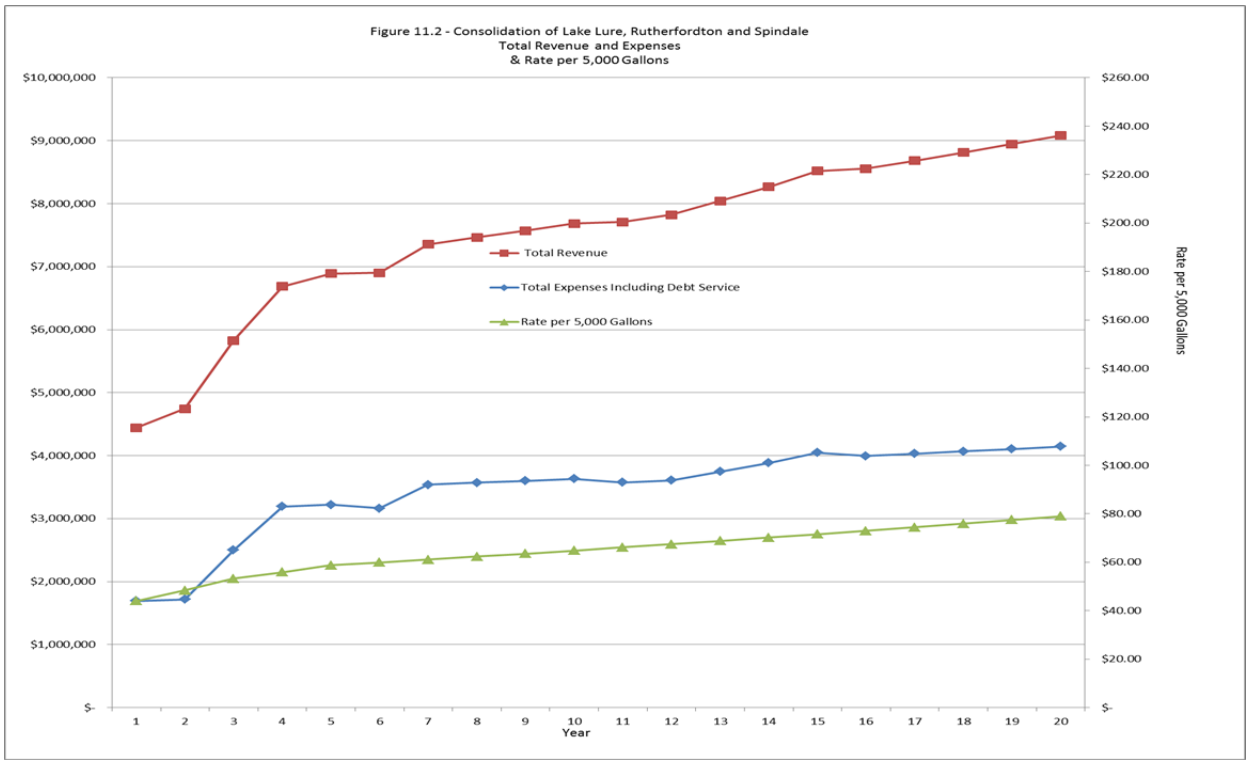
z. Scenario 1 - Consolidating Lake Lure, Rutherfordton and Spindale - would result in a base rate for a 5,000 gallon per month customer of $44.00 the 1st year with rate increases of 10% the first three (3) years, 5% the next two (2) years, and 2% the remaining 15 years with a final base rate in year 20 for a 5,000 gallon per month customer of approximately $79. The capital improvements funded and their time frame for completion included the following:

   i. FY 2017 / 2018 – Spindale WWTP Upgrades
   ii. FY 2018 / 2019 – Lake Lure to Rutherfordton for Treatment
   iii. FY 2021 / 2022 – Rutherfordton to Spindale for Treatment
   iv. FY 2027 / 2028 – Airport Area to Spindale
   v. FY 2028 / 2029 – Area North of Rutherfordton / Hwy 221 to Rutherfordton
   vi. FY 2029 / 2030 – Industrial Area on Hwy 221 near Harris Elementary to Spindale

Please find the financial model for this scenario attached in Appendix 11.54 – Revenue Projects – Consolidation of Lake Lure, Rutherfordton & Spindale and Appendix 11.55 –

Capital Improvements and Net Income – Consolidation of Lake Lure, Rutherfordton & Spindale. And, below and on the following page and in Appendix 11.60 and 11.61, please find Figure 11.1 – Total Revenue and Expenses & Debt Service Coverage Ratio and Figure 11.2 – Total Revenue and Expenses & Rate per 5,000 Gallons for this scenario.

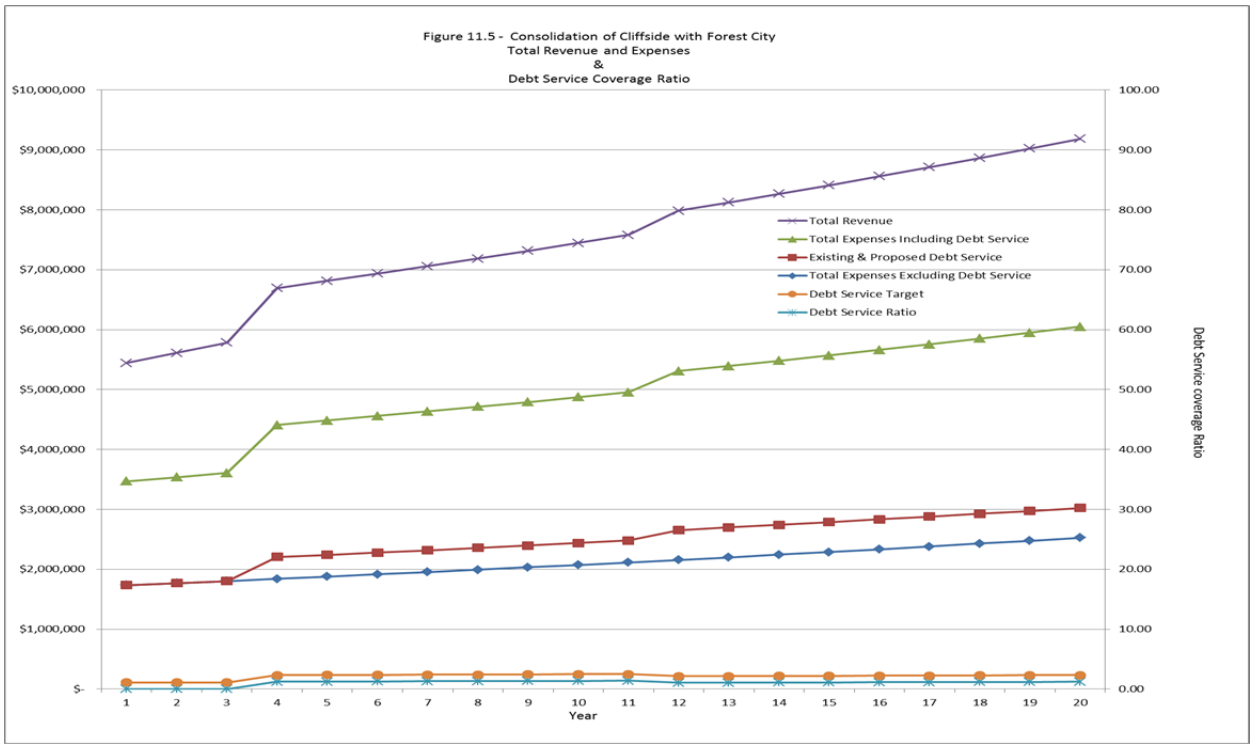


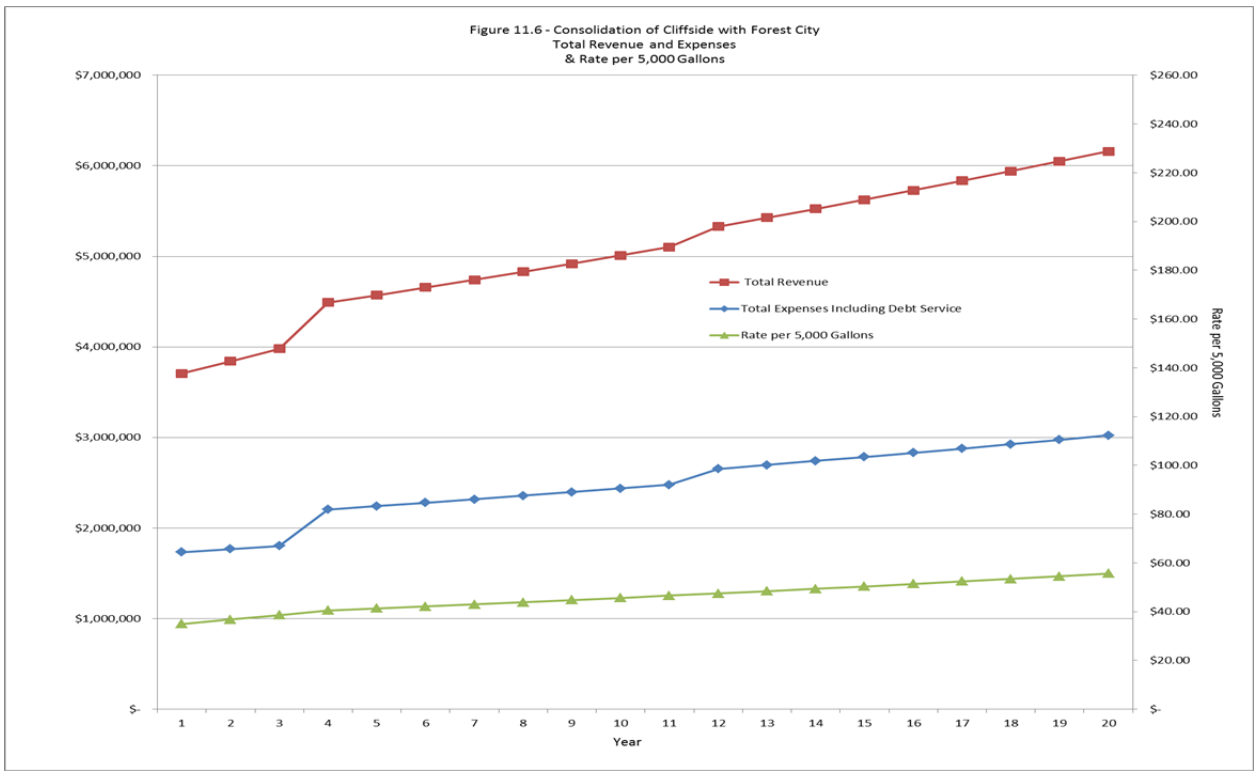


aa. Scenario 2 - Consolidating Cliffside with Forest City - would result in a base rate for a 5,000 gallon per month customer of $35.00 the 1st year with rate increases the next three (3) years at 5% and the remaining 17 years at 2% with a final base rate in year 20 for a 5,000 gallon per month customer of approximately $56. The capital improvements funded and their time frame for completion included the following:

i. FY 2018 / 2019 – Cliffside to Forest City for Treatment
ii. FY 2026 / 2027 – Ellenboro Henrietta Road Interchange to Henrietta

Please find the financial model for this scenario attached in Appendix 11.58 – Revenue Projects – Consolidation of Cliffside with Forest City and Appendix 11.59 – Capital Improvements and Net Income – Consolidation of Cliffside with Forest City. And, on the following page and in Appendix 11.64 and 11.65, please find Figure 11.5 – Total Revenue and Expenses & Debt Service Coverage Ratio and Figure 11.6 – Total Revenue and Expenses & Rate per 5,000 Gallons for this scenario.



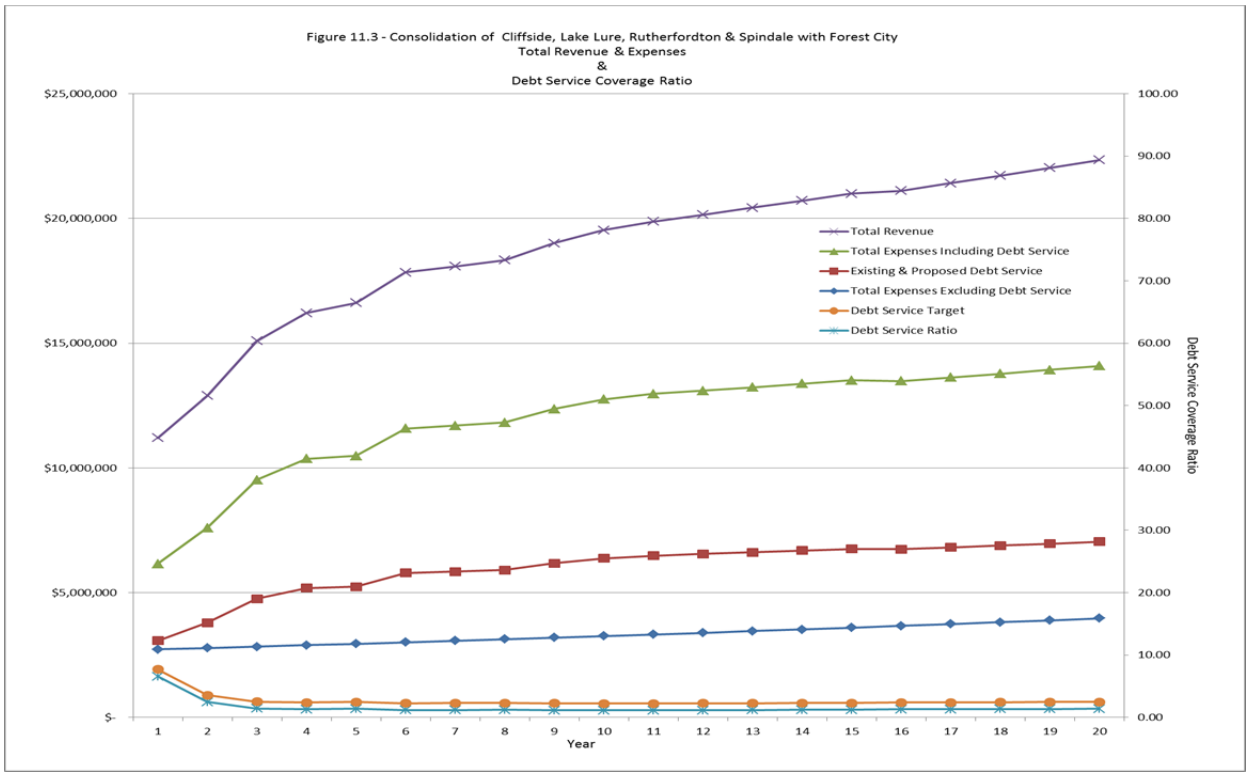


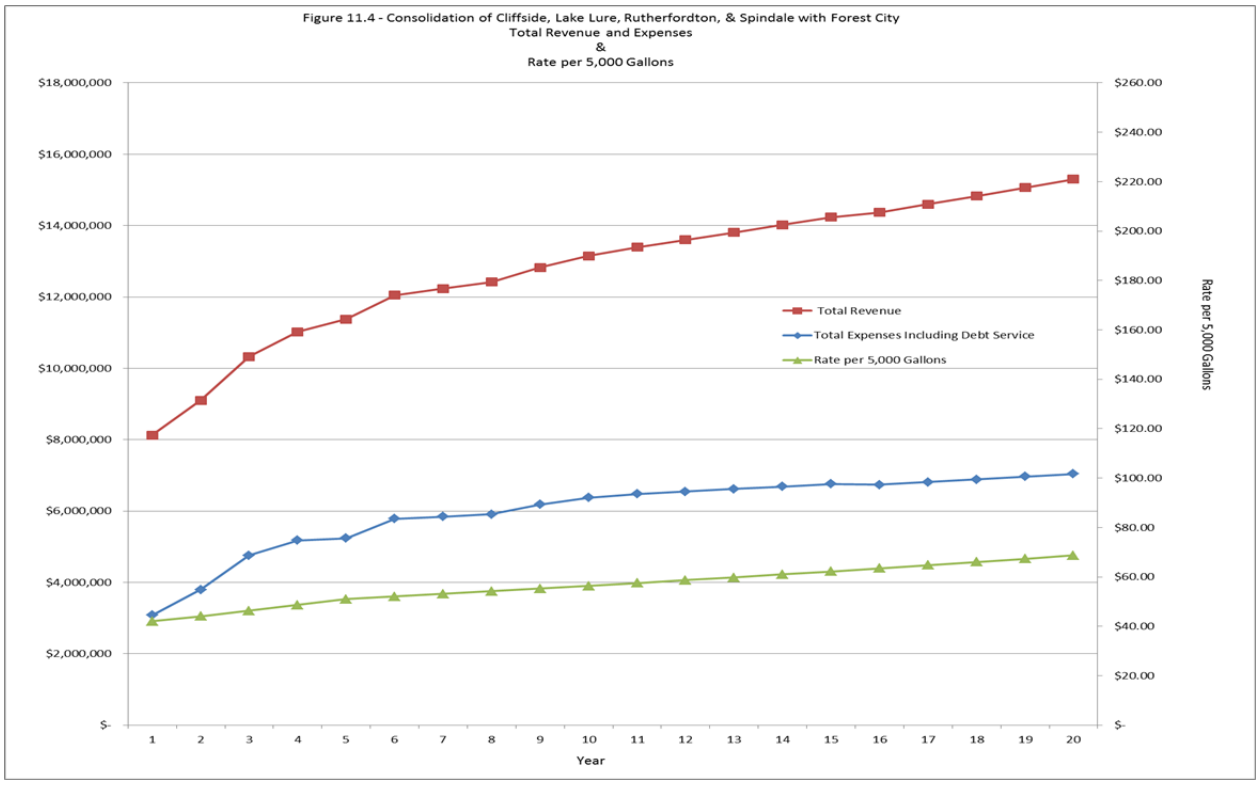
ab. For the purposes of the financial model, a third scenario was also evaluated - Consolidating Cliffside, Lake Lure, Rutherfordton and Spindale with Forest City - would

result in a base rate for a 5,000 gallon per month customer of $42.00 the 1st year with rate increases of 5% the first two (2) years and 2% the remaining 18 years with a final base rate in year 20 for a 5,000 gallon per month customer of approximately $63. The capital improvements funded and their time frame for completion included the following:

i. FY 2016 / 2017 – Lake Lure to Rutherfordton for Treatment
ii. FY 2017 / 2018 – Spindale & Rutherfordton to Forest City for Treatment
iii. FY 2018 / 2019 – Cliffside to Forest City for Treatment
iv. FY 2020 / 2021 – Upgrades to the Forest City WWTP
v. FY 2023 / 2024 – Airport Area to Spindale
vi. FY 2023 / 2024 – Area North of Rutherfordton / Hwy 221 to Rutherfordton
vii. FY 2024 / 2025 – Industrial Area on Hwy 221 near Harris Elementary to Spindale
viii. FY 2025 / 2026 – Ellenboro Henrietta Road Interchange to Henrietta

Please find the financial model for this scenario attached in Appendix 11.56 – Revenue Projects – Consolidation of Cliffside, Lake Lure, Rutherfordton & Spindale with Forest City and Appendix 11.57 – Capital Improvements and Net Income – Consolidation of Cliffside, Lake Lure, Rutherfordton & Spindale with Forest City. And, below and on the following page and in Appendix 11.62 and 11.63, please find Figure 11.3 – Total Revenue and Expenses & Debt Service Coverage Ratio and Figure 11.4 – Total Revenue and Expenses & Rate per 5,000 Gallons for this scenario.





System Descriptions

After reviewing the wastewater collection and treatment system descriptions and the WWTP's respective NPDES permit limits as well as debriefing with their respective Project Stakeholders, the following observations were noted:

a. According to NPDES permit limits and available 7q10 stream flow data, the assimilative capacity of the Town of Rutherfordton WWTP's effluent receiving stream is nominal.

Flow Analysis

A flow analysis was conducted as part of this study. The flow analysis took a limited look at infiltration, inflow, and peak daily flows in the Project Stakeholders wastewater collection and treatment systems. Infiltration information is presented in Table ES.4, Inflow information is presented in Table ES.5, and Peak Daily Flow information is presented in Table ES.6.

Table ES.4 Infiltration Parameter Check

System	Inch-Miles	gpdim	Infiltration Percentage of Total Wastewater
Cliffside	51	382	45%
Forest City	360	1,555	44%
Lake Lure	148	1640	71%
Rutherfordton	274	760	42%
Spindale	430	1,065	53%

Table ES.5 – Inflow Calculations

System	Average Daily Flow (gpd)	Estimated Average Daily Water Consumption (gpd)	Inflow (gpd)	Estimated Sewer System Population	gpdpc
Cliffside	43,000	23,500	19,500	130	150
Forest City	1,260,000	700,000	560,000	5,650	100
Lake Lure	340,000	97,000	243,000	1,000	243
Rutherfordton	500,000	291,000	209,000	2,752	76
Spindale	870,000	413,000	457,000	2,212	205

Note: Population calculated using 2.0 persons per residential customer

Table ES.6 Capacities of Project Stakeholders WWTP's

WWTP	Permitted Capacity	Avg. Daily Flow	Peak Daily Flow	Available Capacity	Calculated Peaking Factor
	(MGD)	(MGD)	(MGD)	(MGD)	
Forest City Second Broad WWTP	4.95	1.26	16.69	3.69	13.2
Forest City Riverstone WWTP	0.05	< 0.005	N/A	0.045	N/A
Forest City DRG WWTP	0.91	Inactive	N/A	> 0.91	N/A
Rutherfordton WWTP	1.0 / 3.0	0.5	4.3	2.5	8.6
Spindale WWTP	3.0 / 4.5 /6.0	0.87	6.1	5.13	7
Cliffside WWTP	0.05 / 1.75	0.043	1.117	1.71	26
Lake Lure WWTP	0.995	0.34	0.63	N/A	1.9

After reviewing the flow analysis conducted for the Project Stakeholders as well as debriefing with their respective staffs, the following observations were noted:

a. Although none of the Project Stakeholders collection systems as a whole are considered excessive by the 3,000 gpdim standard when comparing average daily wastewater flow to estimated average daily water consumption, all project stakeholders collection systems appear to be experiencing significant infiltration when average daily wastewater flows are compared to peak daily wastewater flows as shown in Table 4.11 – Capacities of Project Stakeholders WWTPs.

b. Although none of the Project Stakeholders collection systems as a whole are considered excessive by the 275 gpdpc standard when comparing average daily wastewater flow to estimated average daily water consumption and estimated sewer system population, all

project stakeholders collection systems appear to be experiencing significant inflow when average daily wastewater flows are compared to peak daily wastewater flows as shown in Table 4.11 – Capacities of Project Stakeholders WWTPs. And, Lake Lure and Rutherfordton appear to have the highest inflow rates per capita.

c. Peak Daily Flows at each of the Project Stakeholder's wastewater treatment plants are of concern since the peaks appear to demonstrate excessive inflow –for all sewer collection systems except Lake Lure. Peaking factors should range from 1.5 to 4 whereas for the Project Stakeholders, they ranged from 1.9 to 26 with Cliffside's and Forest City's peaking factors being calculated at 26 and 13, respectively.

Physical Condition Analysis

After reviewing the physical condition analysis as well as debriefing with their respective Project Stakeholders, the following observations were noted:

a. The Cliffside, Lake Lure, Forest City Second Broad River, Rutherfordton, and Spindale WWTPs are subject to influence from significant collection system I&I issues.
b. The Forest City Second Broad River and Spindale WWTPs are the best area facilities for use as regional WWTPs because of their size and the assimilative capacity of their receiving streams.
c. The only Project Stakeholders with an Asset Management Plan and detailed Capital Improvement Plan were the Town of Forest City, the Town of Lake Lure and the Town of Spindale.
d. Lake Lure and Spindale need to upgrade their respective wastewater treatment plants to return to compliance with their NPDES permits or find an alternative means for wastewater disposal.
e. Rutherfordton and Cliffside need to maintain their respective wastewater treatment plants in order to maintain compliance with the NPDES permits.
f. The available assimilative capacity of Cleghorn Creek limits the ability of Rutherfordton's WWTP. Therefore, the Rutherfordton WWTP should not be considered a viable candidate for the location of a consolidated primary WWTP without the relocation of their WWTP discharge.
g. The small size of the Riverstone WWTP limits its ability to take on a large water user and subsequent large wastewater discharger.
h. The condition of the DRG WWTP will require significant capital investment to bring this WWTP back on line to handle any potential industry in the area.
i. A proposed Forest City water intake located downstream of the discharge of the DRG WWTP could impact the future return to service of this WWTP.

Staffing & Operations

After reviewing the staffing and operational analysis as well as debriefing with their respective Project Stakeholders, the following observations were noted:

a. According to published guidelines by EPA Region 4 in their Guide to Collection and Transmission System Management, Operation, and Maintenance Programs and EPA's manual on Estimating Staffing for Municipal Wastewater Treatment Facilities, all of the

project stakeholders are not adequately staffed to conduct sufficient minimum collection system and treatment operations.

b. Project Stakeholders do not appear to have sufficiently documented programmatic elements mandated by NCDENR and EPA and have incomplete Sanitary Sewer Evaluation Study's.

Domestic Sewer Service Analysis

An analysis of areas within the County needing domestic sewer service was conducted as part of the project. As a result, please find Table ES.7 – Rutherford County Domestic Sewer Service Analysis Opinions of Probable Costs on the following page.

Table ES.7 – Rutherford County Domestic Sewer Service Analysis Opinions of Probable Costs

Project	Opinion of Probable Cost
Hwy 74 – Ellenboro / Henrietta Rd Interchange – to Ellenboro	$2,231,000
Hwy 74 – Ellenboro / Henrietta Rd Interchange – to Henrietta	$1,979,000
Industrial Site on Hwy 221 / Harris Elementary – to Spindale	$1,914,000
Industrial Site on Hwy 221 / Harris Elementary – to Riverstone WWTP	$2,145,000

Economic Development Sewer Service Analysis

An analysis of areas within the County needing sewer service for economic development was conducted as part of the project. As a result, please find Table ES.8 – Rutherford County Economic Development Sewer Service Analysis Opinions of Probable Costs below.

Table ES.8 – Rutherford County Economic Development Sewer Service Analysis Opinions of Probable Costs

Project	Opinion of Probable Cost
Hwy 74 – Ellenboro / Henrietta Rd Interchange – to Ellenboro	$2,231,000
Hwy 74 – Ellenboro / Henrietta Rd Interchange – to Henrietta	$1,979,000
Hwy 74 – Hwy 221 Interchange – to Spindale	$150,000
Riverstone Industrial Park	$889,000
DRG WWTP	$1,348,000
Area North of Rutherfordton / Hwy 221	$1,551,000
Rutherford County Airport / Hwy 64 to Spindale	$1,551,000

Mapping / GIS

After reviewing the Project Stakeholders existing digital mapping of their sewer systems and GIS databases as well as debriefing with their respective staffs, the following observations were noted:

a. Existing digital mapping of each of the Project Stakeholders sewer systems provides a somewhat reasonable representation of their facilities. The composite GIS map will provide a foundation as the Project Stakeholders continue to develop their sewer system GIS geodatabases.
b. The Forest City / Ellenboro geodatabase appears to be missing 2 force mains and one pump station appears to have two force mains coming from it. It is suspected that the two pump stations that do not have a force main are actually not pump stations, rather pieces of property owned by the Ellenboro.
c. Lake Lure is missing diameter information for its main trunk lines.
d. Most Project Stakeholders compiled all of their available source documents to complete the inventory as well as some field inventory information. It is imperative that the GIS information be kept up to date and that spatial and attribute discrepancies such as those noted are updated.
e. It appears that each Project Stakeholder has been able to complete a significant part of their sewer system inventory by utilizing source documents. It appears that there are areas of each Project Stakeholders sewer system, however, where source documents do not exist or the information is subject to inaccuracies. Moving forward, these areas should be field verified to ensure system accuracy.
f. Collected data for the manholes in all cases did not include depth, size and material of inlets and outlet for the majority of the Project Stakeholders sewer systems. This information should be obtained for each of the Project Stakeholders sewer systems.
g. It is recommended that each Project Stakeholders sanitary sewer system mapping be updated to greater accuracy to better meet guidelines emphasized by the United States Environmental Protection Agency (USEPA) Capacity, Management, Operations and Maintenance (CMOM) Program and the Project Stakeholder's System Wide Collection Permits.

ES.5 Recommendations:

Options for Consolidation

Finding an organizational solution for organizing a new sewer management entity must consider the varying interests of all of the Project Stakeholders and find ways to mitigate differing philosophies and equities. As a result, the best solution may not necessarily be the same in all instances. And, flexibility should be considered as the most important aspect when initiating consolidation.

Considering these points, it is recommended that Inter-Local Agreements be created for the short-term while a Joint Management Agency structure be pursued to achieve a more efficient level of service to the Project Stakeholders in the intermediate term, with the long term solution being a combination of management structures and entities to manage the complex nature of wastewater service within Rutherford County.

After reviewing the viable options for consolidation as well as discussion with Project Stakeholders staff and elected officials, we have outlined two (2) concurrent, recommended scenarios as follows:

Scenario 1 – Consolidation of Lake Lure, Rutherfordton, and Spindale – Abandonment of Lake Lure's and Rutherfordton's Wastewater Treatment Plant's

a. Form an Advisory Committee between Luke Lure, Rutherfordton, Spindale, Rutherford County, and Broad River Water Authority.
b. Investigate forming Inter-Local Contracts between Rutherfordton, Lake Lure, Spindale, Rutherford County, and Broad River Water Authority under the auspices of working towards forming a Joint Management Agency, a new Sewer Authority, County Sewer District or absorbing sewer as a new operational function within Broad River Water Authority.
c. Lake Lure in conjunction with Rutherford County needs to investigate the feasibility of upgrading their WWTP or tying on to the Town of Rutherfordton including the new wastewater treatment option provided by WK Dickson.
d. Since it appears that the Town of Lake Lure's median household income is above both the National and State median household incomes, it does not appear that Lake Lure would qualify for a grant from USDA. And, due to these same conditions, would only qualify for a market rate loan (versus an intermediate or poverty rate). However, since user rates for Lake Lure customers would become unreasonable when compared to comparable systems and systems with similar economic and income conditions, the potential for a USDA loan and grant needs to be more fully explored.
e. If the Town determines upgrading their WWTP is the most viable option, the Town should consider fully investigating and possibly applying for a USDA loan and grant.
f. If the Town determines connecting to Rutherfordton is the most viable alternative, the Town and the County and the Town and Rutherfordton should consider executing Inter-Local Agreements.
g. The Inter-Local Agreement between the Town and the County could be for the County to form a Tax Increment Financing District for the area that would become developable due to the availability of sewer service on the corridor between Lake Lure and Rutherfordton in an effort to help offset user charges for the proposed project.
h. The Inter-Local Agreement between the Town and Rutherfordton would be for the treatment of Lake Lure's wastewater.
i. Then, the Town of Rutherfordton and the Town of Spindale should consider executing an Inter-Local Agreement for the Town of Spindale to treat Rutherfordton's wastewater.
j. Consider investigating and pursuing an Inter-Local Agreement between the Town's and Broad River Water Authority for the Authority to treat the wastewater from Lake Lure, Rutherfordton, and Spindale at Spindale's wastewater treatment plant.

Scenario 2 – Consolidation of Cliffside and Forest City

a. Form an Advisory Committee between Cliffside, Forest City, and Rutherford County.
b. Investigate forming Inter-Local Contracts between Cliffside, Forest City, and Rutherford County under the auspices of Forest City treating Cliffside's wastewater.
c. The Inter-Local Agreement between Cliffside, Forest City and the County could be for the County to form a Tax Increment Financing District for the area that would become

developable due to the availability of sewer service between Cliffside and Forest City in an effort to help offset user charges for the proposed project.

d. The Inter-Local Agreement between Cliffside and Forest City would be for the treatment of Cliffside's wastewater.

Financial Analysis

As a result of the financial analysis and utility financial model conducted, we recommend the following:

a. Decreasing rate block structures are not looked upon favorably by loan and grant agencies. Cliffside Sanitary District, Forest City, and Rutherfordton should eliminate their declining rate structures due to conservation efforts and the fact that they are complex in nature and change to either a flat block rate structure or inclining block rate.

b. Outside rates that are significantly higher than inside rates are not looked upon favorably by loan and grant agencies as well as the legislature. Lake Lure, Rutherfordton, and Spindale should consider lowering their outside rates to less than double their inside rates.

c. The project stakeholders should consider phased implementation of Scenario 1 - the consolidation of Lake Lure, Rutherford and Spindale and Scenario 2 – the consolidation of Cliffside with Forest City.

System Descriptions

As a result of reviewing the wastewater collection and treatment system descriptions and the WWTP's respective NPDES permit limits, we recommend the following:

a. Since the assimilative capacity of the Town of Rutherfordton WWTP's effluent receiving stream is nominal, the Town should consider other long term options for wastewater treatment and discharge including relocation of its discharge and/or treatment by a neighboring facility for ultimate treatment and disposal.

Flow Analysis

As a result of the limited flow analysis and inflow and infiltration analysis performed, we recommend the following:

a. Each Project Stakeholder should conduct a more detailed review of their available records and information related to their existing pump stations and collection systems to include pump manufacturer, pump size, design pumping capacity, discharge head, wet well size, and pump run-time records. Utilizing available existing collection system GIS records, continue to quantify collections system / drainage basins associated with each pump station. Utilizing pump station runtime and capacity data with rainfall records, evaluate individual collection systems / drainage basins by comparison of wet and dry weather periods to identify and prioritize collection systems / drainage basins that have the highest potential I&I impact on the overall system. This will allow Project Stakeholders to document preliminary I&I findings and move towards providing

recommendations and associated costs for the performance of a more extensive Sanitary Sewer Evaluation Survey's (SSES) in the highest priority collection systems / drainage basins.

b. Consider conducting more extensive SSES's in the highest priority collection systems / drainage basins. The Sanitary Sewer Evaluation Surveys will provide for more detailed assessments of the sanitary sewer collection systems / drainage basins in an effort to construct a prioritized approach for the rehabilitation of the surveyed sewers. The SSES should include, but not be limited to: Dyed Water Flooding; Corrosion Defect Identification; Routine Manhole Inspections; Rainfall & Flow Monitoring; CCTV work; Gravity System Defect Analysis; Smoke Testing; and, Pump Station Performance and Adequacy Analysis.

Physical Condition Analysis

As a result of the limited physical condition analysis conducted, we recommend the following:

a. Cliffside, Lake Lure, Forest City, Rutherfordton, and Spindale should all continue to work towards addressing collection system I&I issues.
b. The Forest City Second Broad River and Spindale WWTPs are the strongest candidates for use as regional WWTPs because of their size and the assimilative capacity of their receiving streams.
c. Cliffside and Rutherfordton should endeavor to prepare an Asset Management Plan and Capital Improvement Plan.
d. Due to the limited assimilative capacity of Cleghorn Creek, Rutherfordton's WWTP receiving stream, Rutherfordton should fully investigate either moving their discharge point if they are to be considered as a consolidated treatment facility and/or transferring their wastewater to a neighboring facility for treatment if they intend to expand or treat a significant increase in wastewater flows beyond their permitted limit.

Staffing and Operations

As a result of the limited staffing and operational analysis conducted, we recommend the following:

a. All project stakeholders should consider conducting a MOM audit of their collection system and collection system programs in accordance with EPA's published guidance and CMOM self-assessment checklist.
b. All project Stakeholders should consider conducting a WWTP facility audit or assessment in accordance with industry standards.

Mapping / GIS

As a result of generating a composite GIS map, we recommend the following:

a. Each Project Stakeholder should consider updating their sewer system inventory in relation to questionable sewer structures. This task would include not only the accurate location of structures, but also the inventory of each structure to confirm size, material, depth, direction of flow and overall condition.

b. Each Project Stakeholder should establish formal data maintenance procedures to ensure the GIS information stays up to date.
c. Each Project Stakeholder should consider the development of a secured Internet Mapping Site for each Project Stakeholder services including Planning and Zoning in coordination with Rutherford County.

ES.6 Obstacles:

Primary obstacles to providing the best long term strategies for sewer service within the County and Towns are seen as follows:

a. The misconception that all project stakeholders are providing all necessary required and recommended wastewater collection and treatment services and that the full cost of service is currently being charged to their rate payers;
b. The value the project stakeholders place on their wastewater collection and treatment system assets;
c. The misconception that the selling of existing project stakeholders wastewater collection and treatment systems assets to the final management entity is fair and reasonable (i.e. project stakeholders rate payers in effect would then pay twice for the wastewater collection and treatment systems);
d. The financial ability of the project stakeholders to implement a better long term strategy or strategies for providing sewer service in the County and Towns without additional financial assistance;
e. The form of control or the interim and the final potential management entity or entities;
f. Condition of the project stakeholders existing wastewater collection and treatment systems;
g. Setting equitable rate structure(s); and,
h. Determination of the project stakeholders that intend to implement a better long term strategy or strategies for providing sewer service in the County and Towns.

ES.7 Conclusions:

Primary conclusions and items that need to be addressed in order to provide the best long term strategy or strategies for sewer service within the County and Towns are seen as follows:

a. All Project Stakeholders assume that the full cost of service is currently being charged to their rate payers when all capital improvements and recommended programs are not funded.
b. A more regionalized approach will benefit rate paying customers in the long term through operations and maintenance efficiencies and economies of scale that can be recognized through the shared use of labor, equipment, purchasing agreements, and capital resources.
c. Savings and efficiencies can be passed on to the ratepayer in the form of reduced rates, or the provision of greater rate stability.
d. The only Project Stakeholders with an Asset Management Plan and detailed Capital Improvement Plan were the Town of Forest City, the Town of Lake Lure and the Town of Spindale and all Project Stakeholders need them.

e. According to published guidelines by EPA Region 4 in their Guide to Collection and Transmission System Management, Operation, and Maintenance Programs and EPA's manual on Estimating Staffing for Municipal Wastewater Treatment Facilities, all of the Project Stakeholders are not adequately staffed to conduct sufficient minimum collection system and treatment operations.

f. Project Stakeholders do not appear to have sufficiently documented programmatic elements mandated by NCDENR and EPA and have incomplete Sanitary Sewer Evaluation Study's.

g. Based on the number of sewer collection and treatment systems in the County, the overall population served, and the land area, consolidation of sewer services within the County while taking into account economies of scale is logical instead of all of the collection and treatment systems trying to be managed independently.

h. All of the Project Stakeholders are experiencing significant Inflow and Infiltration (I&I) and it needs to be addressed in order to maintain the long term viability of the Project Stakeholders wastewater collection and treatment systems as well as maintain compliance with NCDENR and EPA.

i. Lake Lure and Rutherfordton are limited in their ability to expand beyond their permitted flow limits therefore a more regionalized solution may be in order.

j. Lake Lure and Spindale are experiencing compliance problems with their wastewater treatment plants therefore a more regionalized solution may be in order.

k. The Cliffside Sanitary District is not financial viable as a standalone sewer entity.

l. Consolidation and the resulting economies of scale resulting from consolidation can be seen as a mechanism to fund needed substantial capital investment into the Project Stakeholders collection and treatment systems.

m. Maintaining the status-quo or a do nothing approach will result in the following:
   i. Lake Lure's rate payers being subject to substantial rate increases to fund capital improvements.
   ii. Solvency and operational issues associated with the long term viability of the Cliffside Sanitary District as a standalone sewer entity.
   iii. All Project Stakeholders not completely addressing I&I.
   iv. All Project Stakeholders not completely maintaining their collection and treatment systems / funding necessary capital improvements and programmatic mandates.
   v. The possibility of inhibiting economic development because a Project Stakeholder may not have the resources necessary to fund the capital improvements associated with a potential economic development project.

n. Recommendations for consolidation include the following:
   i. Short term - Inter-Local Agreement(s)
   ii. Intermediate term - Joint Management Agency
   iii. Long term - a combination of management structures & entities to manage the complex nature of wastewater service within Rutherford County.

o. The fact that Broad River Water Authority is already in existence is seen as a mechanism for creating a new sewer management entity.

p. The project stakeholders should consider phased implementation of Scenario 1 - the consolidation of Lake Lure, Rutherford and Spindale and Scenario 2 – the consolidation of Cliffside with Forest City.

q. Case studies as discussed in Section 12 of this study including Yadkin Valley Sewer Authority, the Water and Sewer Authority of Cabarrus County, and the Cape Fear

Public Utility Authority as well as other case studies such as Metropolitan Sewerage District of Buncombe County, Tuckaseigee Water & Sewer Authority, Charlotte Mecklenburg Utilities, and Two Rivers Utilities (Gastonia & Cramerton) have successfully demonstrated that:

i. Consolidation makes financial sense;
ii. Lower wastewater rates can be achieved over the long term; and,
iii. Improved planning and more effective investment of capital in a combined utility system leads to improved system reliability.

End of Section